



## CHEMISTRY

### FOR IIT JEE ASPIRANTS OF CLASS 11 FOR CHEMISTRY

#### 14TH GROUP ELEMENTS

CUQ

1. Which element occurs in free state ?

A. C

B. Si

C. Ge

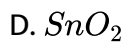
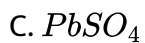
D. Sn

**Answer: A**



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2. Cerussite is



**Answer: A**



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3. Sillicon is an important constituent of

A. Chlorophyll

B. Haemoglobin

C. Rocks

D. Amalgams

**Answer: C**



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4. The least abundant element of IV A group is

A. C

B. Si

C. Ge

D. Pb

**Answer: C**



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5. Metalloid among the following is

A. Bi

B. C

C. Ge

D. Pb

**Answer: C**

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**6. More pronounced inert pair effect is observed in**

A. N

B. Sn

C. C

D. Pb

**Answer: D**

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7. The element with highest electronegativity is

A. C

B. Si

C. Ge

D. Sn

**Answer: A**



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8. Which is the hardest element

A. Iron

B. Silicon

C. Carbon

D. Aluminium

**Answer: C**



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**9.** Lead shows oxidation states of

A. +2 only

B. +4 only

C. +2 and +4

D. -2, +2 and +4

**Answer: C**



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**10.** Density is highest for

A. Si

B. Ge

C. Sn

D. Pb

**Answer: D**



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**11.** Which of the following elements has limited Co-ordination number of four

A. Sn

B. C

C. Si

D. Ge

**Answer: B**

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12. Which is solid at room temperature

A. CO

B.  $CO_2$

C.  $SiO_2$

D.  $OF_2$

**Answer: C**

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13. A lead pencil contains \_\_\_ mixture.

A. Lead

B. Lead Sulphide

C. Lead and clay

D. Graphite and clay

**Answer: D**

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14. The oxidation states exhibited by Tin are

A. +2 and +4

B. +1 and +2

C. +3 and +4

D. +4 only

**Answer: A**

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15. The correct statement with respect to the property of IV A group elements is

- A. Their metallic nature decreases from carbon to lead
- B. The stability of + 2 oxidation state increases from carbon to lead.
- C. IP value increases from carbon to lead.
- D. Atomic radius decreases from carbon to lead.

**Answer: B**



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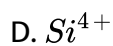
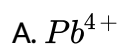
16. Which is not a characteristic property carbon ?

- A. Catenation
- B. Multiple bond formation
- C. Availability of d- orbitals for bonding
- D. Allotropy

**Answer: C**

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**17. Which of the following is more stable?**



**Answer: D**

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**18. Which element does not show a valency of 2**



B. Ge

C. Sn

D. Pb

**Answer: A**



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**19. Which is correct in the case of carbon**

A. It forms complexes

B. It shows inert pair effect

C. It exhibits catenation property

D. Its tetra halides undergo hydrolysis

**Answer: C**



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20. An oxide of an element is a gas and dissolves in water to give an acidic solution. The element belongs to

- A. II A group
- B. IV A group
- C. VIII group
- D. Zero group

**Answer: B**



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21. The incorrect statement about  $SiCl_4$

- A.  $SiCl_4$  does not form  $[SiCl_6]^{2-}$
- B.  $SiCl_4$  mixed with ammonia is used in warfare for the production of smoke screens
- C.  $SiCl_4$  can undergoes hydrolysis to give  $H_4SiO_4$

D. In  $SiCl_4$ ,  $Cl^-$  ions are accommodated in square planar manner around  $Si^{4+}$  ion

**Answer: D**

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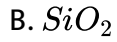
22. Silicon hydrides are called

- A. Silicones
- B. Silicates
- C. Silicides
- D. Silanes

**Answer: D**

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23. The neutral oxide is

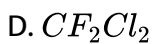


Answer: D



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24. Which of the following is used as refrigerant



**Answer: D**

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**25.** The element which forms neutral as well as acidic oxide is

A. Sn

B. Si

C. C

D. Pb

**Answer: C**

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**26.** Which is an amphoteric oxide

A.  $CO_2$

B. CO

C.  $GeO_2$

D.  $SiO_2$

**Answer: C**

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27. Which is not correct ?

A.  $GeO_2$  is amphoteric

B.  $SiO_2$  is acidic oxide

C.  $SnCl_4$  is more stable than  $SnCl_2$

D.  $PbCl_4$  is more stable than  $PbCl_2$

**Answer: D**

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28. The number of Carbon compounds is very large because it

- A. Is tetravalent
- B. Forms double and triple bond
- C. Is non metal
- D. Shows Catenation

**Answer: D**



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29. In C-60 all carbon atoms are

- A.  $sp^2$  - Hybridised with a soccer ball shape
- B.  $sp^3$  - Hybridised with a square antiprism shape
- C.  $sp^2$  - Hybridised with a diamond shape
- D.  $sp^2$  - Hybridised with a graphite like shape

**Answer: A**

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**30.** Bond energy is highest for :

A. Sn - Sn

B. Ge - Ge

C. C - C

D. Si - Si

**Answer: C**

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**31.** The nature of chemical bonding in diamond is

A. Metallic

B. Coordinate covalent

C. Ionic

D. covalent

**Answer: D**



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**32. The Semiconductor of the following is**

A. Graphite

B. Silicon

C. Gas Carbon

D. Lead

**Answer: B**



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33. Hybridisation of carbon atoms in diamond is

A.  $sp$

B.  $sp^2$

C.  $sp^3$

D.  $sp^3d$

**Answer: C**



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34. The bond angle in diamond is

A.  $104.5^\circ$

B.  $107^\circ$

C.  $120^\circ$

D.  $109^\circ 28'$

**Answer: D**



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**35. Which has highest melting point ?**

- A. Silicon
- B. Lead
- C. Tin
- D. Diamond

**Answer: D**



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**36. The Carbon -Carbon bond length in diamond is**

- A.  $1.2\text{\AA}$

B.  $1.54A^0$

C.  $1.42A^0$

D.  $1.34A^0$

**Answer: B**



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**37.** The type of hybridisation in graphite is

A.  $sp$

B.  $sp^2$

C.  $sp^3$

D.  $sp^3d$

**Answer: B**



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**38.** Black lead is

- A. Diamond
- B. Graphite
- C. Gas Carbon
- D. Petroleum coke

**Answer: B**



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**39.** Graphite has

- A. Tetrahedral structure
- B. Hexagonal sheet like structures
- C. Linear structure
- D. Three dimensional structure

**Answer: B**

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**40.** How many number of free electrons present on each carbon atoms in graphite

A. zero

B. 3

C. 2

D. 1

**Answer: D**

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**41.** The purest form of coal is

- A. Peat
- B. Anthracite
- C. Lignite
- D. Bituminous

**Answer: B**

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**42. Inert form of carbon is**

- A. Diamond
- B. Graphite
- C. Coal
- D. Charcoal

**Answer: A**

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43. Which of the following is not an allotrope of carbon

A. Graphite

B. Diamond

C. Coke

D. Carborundum

**Answer: D**



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44. Which of the following is a conductor of electricity ?

A. Diamond

B. Coke

C. Graphite

D. Charcoal

**Answer: C**



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**45.** The no of pure atomic orbitals at each carbon in graphite are

A. 2

B. 3

C. 1

D. 4

**Answer: C**



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**46.** Tendency of catenation is strongest in



A. Si

B. N

C. O

D. C

**Answer: D**



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**47.** The hybridisation of carbon in diamond, graphite and acetylene are respectively

A.  $sp^3$ ,  $sp$ ,  $sp^2$

B.  $sp^3$ ,  $sp^2$ ,  $sp$

C.  $sp$ ,  $sp^2$ ,  $sp^3$

D.  $sp^2$ ,  $sp^3$ ,  $sp$

**Answer: B**

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48. Forces that bind atoms in diamond are

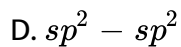
- A. Ionic
- B. Dipolar
- C. Vanderwaals
- D. Covalent

Answer: D

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49. The type of sigma bond between C-C in graphite is

- A. sp-sp
- B.  $sp^3 - sp^3$
- C. p-p



**Answer: D**

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**50.** Which element shows catenation

A. Cd

B. Si

C. Sn

D. Pb

**Answer: B**

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**51.** The order of catenation power is

A.  $C > Si > Ge > Sn$

B.  $Si > C > Ge > Sn$

C.  $Sn > Ge > Si > C$

D.  $Ge > Sn > C > Si$

**Answer: A**

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52. When diamond is heated at  $1800 - 2000^{\circ}\text{C}$  in vacuum it converts into

A. Graphite

B. Coke

C.  $\text{CO}_2$

D.  $\text{CO} + \text{CO}_2$

**Answer: A**

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53.  $\Delta H_f^0$  of diamond is

A. 0  $\text{kJ mol}^{-1}$

B. 1.90  $\text{kJ mol}^{-1}$

C. 38.1  $\text{kJ mol}^{-1}$

D. 20  $\text{kJ mol}^{-1}$

**Answer: B**



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54. Which has two dimensional sheet like structure

A. Diamond

B. Silica

C. Graphite

D. Lead

**Answer: C**



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**55.** The number of carbon atoms surrounding each carbon in diamond is

A. 4

B. 3

C. 2

D. zero

**Answer: A**



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**56.** The value of refractive index of diamond is

A. 1.45

B. 2.45

C. 3.4

D. 1.54

**Answer: B**

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57. The carbon - carbon bond length in graphite is

A.  $1.34 \text{ \AA}$

B.  $1.54 \text{ \AA}$

C.  $1.42 \text{ \AA}$

D.  $1.20 \text{ \AA}$

**Answer: C**

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58. In graphite adjacent layers of carbon atoms are held together by

- A. Covalent bonds
- B. Vander waal forces
- C. Hydrogen bond
- D. Ionic bonds

**Answer: B**



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59. In graphite adjacent layers are separated by a distance of

- A.  $3.35\text{\AA}$
- B.  $1.54\text{\AA}$
- C.  $1.42\text{\AA}$



D.  $2.45A^0$

**Answer: A**



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**60.** Which of the following is a non metallic conductor

A. Cs

B. Coke

C. Diamond

D. Graphite

**Answer: D**



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61. The catenation tendency of  $C$ ,  $Si$ , and  $Ge$  is in the order  $Ge < Si < C$ . The bond energies (in  $kJmol^{-1}$ ) of  $C - C$ ,  $Si - Si$ , and  $Ge - Ge$  bonds, respectively, are

A. 167, 180, 348

B. 180, 167, 348

C. 348, 167, 180

D. 348, 180, 167

**Answer: D**



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62. Which of the following is true for diamond

A. It is a good conductor of electricity

B. It is very soft

C. It is a bad conductor of heat

D. Diamond is made up of carbon, hydrogen and oxygen atoms

**Answer: C**



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**63.** Which of the following is used in the preparation of aerated water

A. CO

B.  $CO_2$

C.  $SO_2$

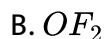
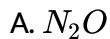
D. HCl

**Answer: B**



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64. compound that combines with haemoglobin of blood to form carboxy haemoglobin of blood to form carboxy haemoglobin is

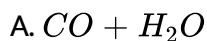


**Answer: D**



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65. Incomplete combustion of petrol or diesel oil in automobile engines can be best detects by testing the fuel gases for the presence of



D.  $SO_2$

**Answer: B**

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66. in silicon dioxide :

- A. Each silicon atom is surrounded by four oxygen atoms and each oxygen atom is bonded to two silicon atoms.
- B. Each silicon atom is surrounded by two oxygen atoms and each oxygen atom is bonded to two silicon atoms.
- C. Silicon atom is bonded to two oxygen atoms
- D. There are double bonds between silicon and oxygen atoms.

**Answer: A**

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67. Which gas is essential constituent of almost all fuel gases

A.  $CO_2$

B.  $N_2$

C. CO

D.  $SO_2$

**Answer: C**



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68. Carbon monoxide is not used in

A. Fire extinguisher

B. The manufacture of water gas

C. The manufacture of methanol and synthetic petrol

D. Metal operations as a reducing agent.

**Answer: A**



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**69.** The ratio of "Si" and "O" atoms in silica is

A. 1 : 2

B. 2 : 1

C. 1 : 4

D. 4 : 1

**Answer: A**



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**70.** Which is the crystalline form of silica

A. Agate

B. Jasper

C. Onyx

D. Crystobalite

**Answer: D**



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71. When  $\alpha$ - quartz is heated to  $575^{\circ}$  C it changes to

A. Onyx

B.  $\beta$  - quartz

C. Tridymite

D. Crystobalite

**Answer: B**



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72. Rock crystal is

- A. NaCl
- B. Sand
- C. Quartz
- D. Agate

**Answer: C**

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73.  $SiO_2$  is reacted with sodium carbonate. What is the gas liberated ?

- A. CO
- B.  $O_2$
- C.  $CO_2$
- D.  $O_3$

**Answer: C**

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**74.** Which one of the following is used as an acidic flux in metallurgy ?

A. CaO

B.  $SiO_2$

C.  $Na_2CO_3$

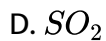
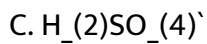
D.  $SO_2$

**Answer: B**

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**75.** Silica is soluble in

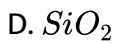
A. HCl



**Answer: D**

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**76. Which compound is solid**



**Answer: D**

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77. Which is not true about  $SiO_2$

- A. It is a net work solid
- B. It is attacked by molten NaOH
- C. It is attacked by HF
- D. It is the basic structural unit of silicates

**Answer: D**



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78. Which is the anhydride of orthosilicic acid

- A. Si
- B. SiO
- C.  $SiO_2$
- D.  $SiO_3$

**Answer: C**

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**79.** Carborundum is the commercial name of

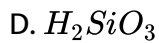
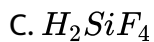
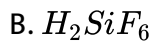
- A.  $Al_2O_3$
- B.  $H_3PO_4$
- C. SiC
- D.  $H_4SiO_4$

**Answer: C**

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**80.** The final product formed when silica reacts with hydrogen fluoride is

- A. SiF

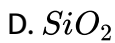
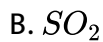
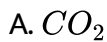


**Answer: B**



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81. Which oxide has three dimensional structure



**Answer: D**



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**82.** Which is the amorphous form of silica

- A. Quartz
- B. Tridymite
- C. Onyx
- D. Cristobalite

**Answer: C**



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**83.** Purest form of silica is

- A. Quartz
- B. Flint
- C. Sand stone
- D. Jaspar

**Answer: A**



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**84.** Silica dissolves in NaOH solution to form

- A. Quartz
- B. Sodium silicate
- C. Carborundum
- D. Jaspar

**Answer: B**



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**85.** Hybridisation of silicon atom in silica is

- A. sp



B.  $sp^2$

C.  $sp^3$

D.  $sp^3d$

**Answer: C**

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**86.** The number of Oxygen atoms bonded to each silicon atom in silica crystal is

A. 1

B. 2

C. 3

D. 4

**Answer: D**

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87. The structure of silica is

- A. Layer lattice
- B. Tetrahedral
- C. Trigonal
- D. Linear

**Answer: B**



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88. 1 Carrot is equal to

- A. 10 mg of C
- B. 20 mg of C
- C. 200 mg of C
- D. 1 mg of C

**Answer: C**

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**89.** Which one of the following is correct set of  $SiO_2$

- A. Linear, acidic
- B. Linear, Basic
- C. Tetrahedral, Acidic
- D. Angular, Basic

**Answer: C**

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**90.** Quartz is the purest form of

- A.  $CO_2$

B.  $SiO_2$

C.  $SO_2$

D.  $NO_2$

**Answer: B**



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**91.** The structure of crystalline silica is similar to that of

A. Diamond

B. Graphite

C. Silicates

D. Silicic acid

**Answer: A**



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92. Which of the following is used for making optical instruments

A.  $SiO_2$

B. Si

C.  $SiH_4$

D. SiC

**Answer: A**



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93. Organosilicon polymers containing which type of linkages.

A. Si-S-Si

B. Si-O-Si

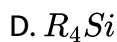
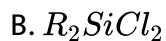
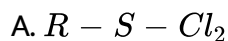
C. Si-N-Si

D. Si-C-Si

**Answer: B**

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94. Alkyl chloride when passed over silicon at  $300^{\circ}\text{C}$  in the presence of Cu catalyst gives



**Answer: B**

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95. In silicones silicon is strongly linked to .

- A. Oxygen
- B. nitrogen
- C. sulphur
- D. carbon.

**Answer: A**

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**96.** Hydrolysis of chlorosilanes to give.

- A. monomers
- B. dimers
- C. polymers
- D. trimers

**Answer: C**

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97. Silicones are used as.

- A. Conductors
- B. Insulators
- C. Semiconductors
- D. To prepare graphite

**Answer: B**



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98. Silicones are

- A. Toxic
- B. Non-Toxic
- C. Bitter



D. Sour

**Answer: B**



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**99.** Solid silicones are stable upto

A.  $100^{\circ}C$

B.  $250^{\circ}C$

C.  $300^{\circ}C$

D.  $400^{\circ}C$

**Answer: B**



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**100.** Which of the following Si biocompatible

- A. Silicone
- B. Poly thene
- C. Teflon
- D. Balcelite

**Answer: A**

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**101.** Silicones have the general formula

- A.  $SiO_4^{4-}$
- B.  $SiO_7^{6-}$
- C.  $(R_2SiO)_n$
- D.  $(SiO_3)_n^{2n}$

**Answer: C**

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**102.** The total number of silicates possible are.

A. 2

B. 10

C. 5

D. 6

**Answer: D**



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**103.** Ceramics and glass are also called as.

A. Silicones

B. Zeolites

C. Silicates

D. Insulators

**Answer: C**



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**104.** The Si-O bonds in silicates are.

A. Very strong

B. Weak

C. Very weak

D. Moderate

**Answer: A**



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**105.** Zeolites act as

A. Atomic sieves

B. Molecular sieves,

C. Ionic sieves

D. Radical sieves

**Answer: B**



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**106.** In the softening of water when zeolites are exercised the following metal ion is replaced by  $Na^+$

A.  $Ca^{+2}$

B.  $Ba^{+2}$

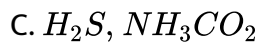
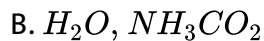
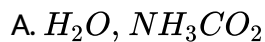
C.  $Be^{+2}$

D.  $Zn^{+2}$

**Answer: A**

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107. The following molecules are trapped in the formation of molecular sieves



**Answer: A**

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Level I C W

1. Commercially important ore of Lead is

A. Haematite

B. Sphalerite

C. Siderite

D. Galena

**Answer: D**



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**2. The common semiconductor is**

A. Fe

B. Se

C. Ge

D. C

**Answer: C**



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3. In  $CH_4$ , valency of carbon is four . Valency of carbon in acetylene is .

A. 1

B. 2

C. 3

D. 4

**Answer: D**



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4. Which is not correct

A.  $Ge(OH)_2$  is amphoteric

B.  $GeCl_2$  is more stable than  $GeCl_4$

C.  $GeO_2$  is weakly acidic



D.  $GeCl_4$  in HCl forms  $[GeCl_2]^{2-}$  ion

**Answer: B**

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5. Which of the following is a reducing agent and undergoes hydrolysis

A.  $CH_4$

B.  $C_2H_6$

C.  $C_3H_8$

D.  $SiH_4$

**Answer: D**

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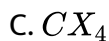
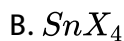
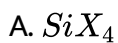
6.  $[SiF_6]^{2-}$  is known whereas  $[SiCl_6]^{2-}$  not. Reason is

- A. Six large chloride ions can not be accommodated around  $Si^{4+}$  due to limitation of its size.
- B. Interaction between lone pair of chloride ion and  $Si^{4+}$  is not very strong.
- C. Both 1 and 2
- D. Presence of d-orbitals in chlorine

**Answer: C**

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7. The compound of the following that can not act as lewis acid is (x-is halogen)

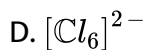
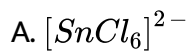




**Answer: C**

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**8. Which does not exist**



**Answer: D**

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**9. Which of the following has least tendency to undergo catenation**

A. C

B. Si

C. Ge

D. Sn

**Answer: D**

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**10. Diamond and Graphite are**

A. Isomers

B. Isotopes

C. Allotropes

D. Polymers

**Answer: C**

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11. Which has highest boiling point

- A. Diamond
- B. Graphite
- C. Charcoal
- D. Lamp black

**Answer: A**



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12. The use of diamond as a gem depends on its

- A. Hardness
- B. High refractive index
- C. Purest form of carbon

D. Chemical inertness

**Answer: B**

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**13.** The hardness of diamond is due to

- A. Giant polymer structure
- B. High refractive index
- C. Hexagonal layer lattice structure
- D. High electronegativity of carbon

**Answer: A**

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**14.** The glittering nature of diamond is due to

- A. Gaint polymer structure
- B. High refractive index
- C. High IP value of carbon
- D. High electro negativity of carbon

**Answer: B**

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**15.** The hybrid orbitals with 33.33% S-character are involed in the bonding of one of the crystalline allotropes of carbon. The allotrope is

- A. Carbon black
- B. Graphite
- C. Diamond
- D. Gas carbon

**Answer: B**

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16. Which of following is a correct set

A. Graphite,  $SP^2$

B. Diamond,  $SP^2$

C. Graphite,  $SP^3$

D. Diamond, SP

**Answer: A**

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17. The number of \_\_\_ membered rings 20 and \_\_\_ membered rings 12 are in buckminster fullerene respectively

A. 6,5

B. 5,6



C. 5,4

D. 4,5

**Answer: A**



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**18.** Carbon monoxide is poisonous because it

A. Dries up

B. Reduces the organic matter of tissues

C. Combines with haemoglobin and causes deficiency of oxygen in  
blood

D. Combines with the  $O_2$  present in blood to form  $CO_2$

**Answer: C**



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19. Carbon in  $CO_2$  is

- A.  $sp$  hybridised
- B.  $sp^2$  hybridised
- C.  $sp^3$  hybridised
- D.  $dsp^3$  hybridised

**Answer: A**



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20. The anhydride of carbonic acid  $H_2CO_3$  is

- A.  $C_2O_2$
- B.  $CO_2$
- C.  $CO_2$
- D. CO

**Answer: B**



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21. In  $H_2SiF_6$  the covalency of silicon is

A. +2

B. +4

C. +6

D. +8

**Answer: B**



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22. Glass is soluble in

A. HF

B.  $H_2SO_4$

C.  $HClO_4$

D. Aqua-regia

**Answer: A**

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**23.** Aqueous solution of Sodium silicate is

A. Acidic

B. Alkaline

C. Neutral

D. Insoluble

**Answer: B**

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24. Which of the following is used as black pigment in black ink and as filler in automobile tyres ?

- A. Carbon black
- B. Germanium
- C. Graphite
- D. Coke

**Answer: A**



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25. The empirical formula of silicones is analogous to

- A. Alcohols
- B. Aldehydes
- C. Ketones
- D. Ethers

**Answer: C**



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**26.** Chemically zeolites are

- A. Alumino silicate
- B. Calcium alumino silicate
- C. Hydrated sodium alumino silicate
- D. Silicones

**Answer: C**



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**27.** Zeolites are used as

- (a) Ion exchangers , (b) Molecular sieves

(c ) Water softener

The correct uses are

A. a,b only

B. b,c only

C. a,c, only

D. a,b,c

**Answer: D**



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**Level II C W**

1. Which of the following elements reacts with steam

A. C

B. Ge

C. Si

D. Sn

**Answer: D**

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2. Which one of the following elements reduces NaOH to Na

A. Si

B. Pb

C. C

D. Sn

**Answer: C**

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3. Carbon tetrachloride has no net dipole moment because of

- A. Planar structure
- B. Smaller size of C and Cl atoms
- C. Regular tetrahedral structure
- D. None of these

**Answer: C**



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4. Bent, sp

- A. Trigonal,  $sp^2$
- B. Octahedral,  $sp^3d^2$
- C. Tetrahedral,  $sp^3$
- D.

**Answer: D**



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**5.** The average value of C-C bond order in graphite is

A.  $4/3$

B.  $3/4$

C.  $3/2$

D. 1

**Answer: A**



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**6.** Which of the following structure is similar to graphite e?

A. BN

B. B

C.  $B_4C$

D.  $B_2H_6$

**Answer: A**

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7. CO forms a volatile carbonyl complex with which of the following metals ?

A. I & III

B. I & II

C. III & IV

D. I & IV

**Answer: B**

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8. When oxalic acid is heated with concentrated  $H_2SO_4$  it produces

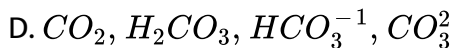
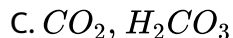
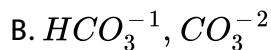
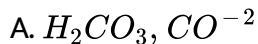


**Answer: A**



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9. The species present in solution when  $CO_2$  is dissolved in water



**Answer: D**

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10. A and B are the compounds of carbon. A on passing over red hot coke, is converted to B. A and B are

A.  $CO$  and  $CO_2$

B.  $CH_4$  and  $C_2H_6$

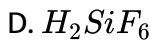
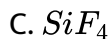
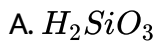
C.  $CO_2$  and  $CO$

D.  $CCl_4$  and  $CHCl_3$

**Answer: C**

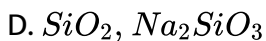
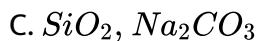
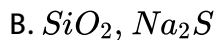
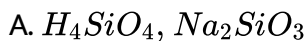
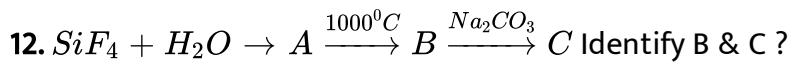
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11.  $SiCl_4 + 4H_2O \rightarrow X + 4HCl$  'X' on heating upto  $1000^{\circ}C$  'Y' on treating with HF, the final product obtained is



**Answer: D**

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**Answer: D**

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13. Decreasing order of "P" orbital Character in the following

a)  $SiO_2$  ,  $CO_2$  , c) Graphite

A.  $a > b > c$

B.  $b > a > c$

C.  $b > c > a$

D.  $a > c > b$

Answer: D



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14. Which of the following statements are true about quartz,

A) it is pure crystalline form of silica

B) it is a tetrahedral polymer of  $SiO_2$

C) UV light can pass through quartz

A. A and B are correct

B. B and C are correct

C. A and C are correct

D. all are correct

**Answer: D**

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15. Silicon has a strong tendency to form polymers like silicones, the chain length of silicone polymer can be controlled by adding

A.  $MeSiCl_3$

B.  $MeSiCl_2$

C.  $Me_2SiCl$

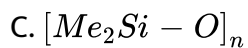
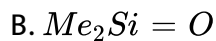
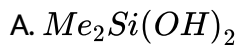
D.  $Me_4Si$

**Answer: C**



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16.  $(Me)_2SiCl_2$  on hydrolysis will produce.



**Answer: A**

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17. How many corners of  $SiO_4$  units are shared in the formation of three dimensional

A. 3

B. 2

C. 4

D. 1

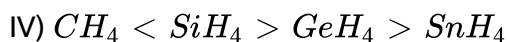
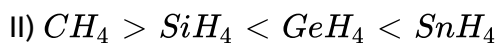
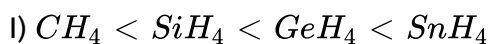
**Answer: C**



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**Level Iii**

1. The correct order for melting point and boiling point of IV group hydrides respectively



A. II,I

B. I,II

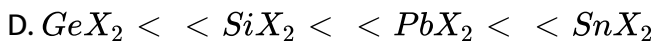
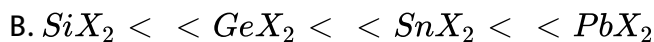
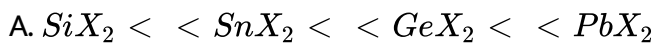
C. III, IV

D. IV, III

**Answer: A**

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2. The order of the stability of dihalides of Si, Ge, Sn and Pb changes in sequence



**Answer: B**

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3. A metal, M from chlorides in its +2 and +4 oxidation states. Which of the following statement about these chlorides is correct?

- A.  $MCl_2$  is more soluble in anhydrous ethanol than  $MCl_4$
- B.  $MCl_2$  is more ionic than  $MCl_4$
- C.  $MCl_2$  is more easily hydrolysed than  $MCl_4$
- D.  $MCl_2$  is more volatile than  $MCl_4$

Answer: B



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4. Graphite is a soft solid lubricant extremely difficult to melt. The reason for this anomalous behaviour of graphite -

- A. Carbon atoms are arranged in large plates of rings of strongly bound carbon atoms with weak interplate bonds
- B. Is a non-crystalline substance

C. Has molecules of variable molecular masses like polymers

D. Is an allotropic form of diamond.

**Answer: A**

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5.  $L_1$  is the length between two adjacent carbon atoms in a layer and  $L_2$  is the length in between two layers of graphite. The approximate ratio between  $L_1$  and  $L_2$  is

A. 1 : 1

B. 2 : 5

C. 5 : 2

D. 1 : 5

**Answer: B**

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6. Which of the following statement is wrong about CO

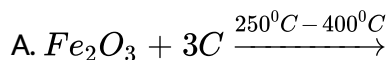
- A. It acts as lewis base in the formation of metal carbonyls
- B. It is a neutral oxide
- C. It acts as acid with NaOH under high pressure, temperature to give sodium formate
- D. It acts as a p acceptor by accepting electrons from the central metal during complex formation

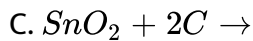
Answer: A



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7. The reaction that gives  $CO_2$  as one of the products is





**Answer: B**

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8. Carbon dioxide is a gas but silica is a solid because

A. Carbondioxide is composed of discrete covalent  $\text{CO}_2$  molecules  
where as silica has continuous tetrahedral structure

B.  $\text{CO}_2$  molecules are lighter than  $\text{SiO}_2$  molecules

C.  $\text{CO}_2$  is more acidic than  $\text{SiO}_2$

D. Melting point of silica is very high

**Answer: A**

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9. The tetravalent elements A and B form dioxides both react with NaOH to form similar salts  $\angle OAO$  is  $180^\circ$  is  $109^\circ 28'$ . Both are acidic in nature A and B are respectively

- A. Ge and Si
- B. S and Si
- C. C and Si
- D. Si and C

**Answer: C**

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10.  $SiO_2 + A \rightarrow X + Y$ . In this reaction 'Y' is one of the global warming gases. 'A' is the water soluble alkalimetal carbonate. Whose molecular weight is 106. The common name of 'X' is

- A. Washing soda



B. Baking soda

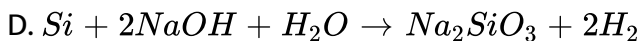
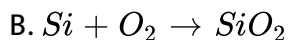
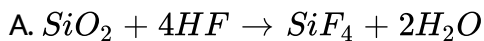
C. Flint glass

D. Water glass

**Answer: D**

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11. Silica reacts with hydride of superhalogen to form 'X'. On hydrolysis of 'X' another compound 'Y' is formed. 'Y' on heating at  $1000^{\circ}\text{C}$  loses water to form 'Z'. The 'Z' can also be prepared in the following reaction.



**Answer: B**



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12. Often a ground glass stopper gets stuck in the neck of a glass bottle containing  $NaOH$  solution. This is due to ,

- A. The presence of dirt particles in between
- B. The formation of solid silicate in between by the reaction of  $SiO_2$  of glass with  $NaOH$
- C. The formation of  $Na_2CO_3$  in between by the reaction of  $CO_2$  of air and  $NaOH$
- D. Glass contains a boron compound which forms a ppt with the  $NaOH$  solution

**Answer: B**



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13. Identify B in the following  $H_4SiO_4 \xrightarrow[-H_2O]{1000^{\circ}C} A \xrightarrow[?]{\text{Carbon}} B + CO$

A. Corundum

B. Quartz

C. Silica

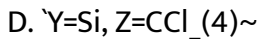
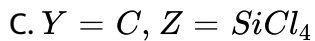
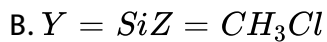
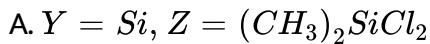
D. Carborundum

**Answer: D**



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14. An alkyl halide reacts with a group 14 element, 'Y' at 570 K with Cu as a catalyst producing a dialkyl chloro compound 'Z'. The compound 'Z' on hydrolysis gives another compound which is a strong water repellent and quite inert chemically. The dioxide of 'Y' is acidic in nature. The alkyl halide can also be obtained from methane after mono-substitution. The comp 'Y' and 'Z' are



**Answer: A**

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15. Which of the following exists as covalent crystals in the solid state?

A. Iodine

B. Silicon

C. Sulphur

D. Phosphorous

**Answer: B**

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16. The soldiers of Napoleon army while at Alps during freezing winter suffered a serious problem with regard to the tin buttons of their uniform. White metallic tin buttons get converted to grey powder. This transformation is relate to

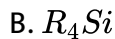
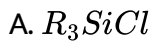
- A. An interaction with nitrogen of the air at very low temperatures
- B. An interaction with water vapour contained in the humid air.
- C. A change in the partial pressure of oxygen in the air
- D. A change in the crystalline structure of tin

**Answer: D**



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17. Among the following substituted silanes, the one which will give rise to cross linkes silicons polymer on hydrolysis is



**Answer: C**

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**Level Iv**

1. Statement-I : Adamantine silicon is obtained by heating silica with aluminium.

Statement-II : Adamantine silicon is an alloy of aluminium and silicon.

A. Both Statement -I and Statement -II are true and Statement -II is the correct explanation of Statement-I.

- B. Both Statement -I and Statement -II are true and Statement-II is not the correct explanation of Statement-I.
- C. Statement-I is true and Statement-II is false
- D. Statement-I is false but Statement -II is true

**Answer: B**

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2. Statement-I : Tin (IV) chloride is a solid with high melting point.

Statement -II : Tin (IV) chloride is an ionic compound.

- A. Both Statement -I and Statement -II are true and Statement -II is the correct explanation of Statement-I.
- B. Both Statement -I and Statement -II are true and Statement-II is not the correct explanation of Statement-I.
- C. Statement-I is true and Statement-II is false

D. Statement-I is false but Statement -II is true

**Answer: A**

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3. Assertion : Si-Si bond is stronger than Si-O bond.

Reason: Silicon form Si-Si bond easily.

- A. Both Statement -I and Statement -II are true and Statement -II is the correct explanation of Statement-I.
- B. Both Statement -I and Statement -II are true and Statement-II is not the correct explanation of Statement-I.
- C. Statement-I is true and Statement-II is false
- D. Statement-I is false but Statement -II is true

**Answer: A**

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4. Statement-I :  $PCl_5$  and  $PbCl_4$  are thermally unstable.

Statement-II : They produce same gas on thermal decomposition

- A. Both Statement -I and Statement -II are true and Statement -II is the correct explanation of Statement-I.
- B. Both Statement -I and Statement -II are true and Statement-II is not the correct explanation of Statement-I.
- C. Statement-I is true and Statement-II is false
- D. Statement-I is false but Statement -II is true

**Answer: D**



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5. Quartz is extensively used as a piezoelectric material, it contains

- A. Pb

B. Si

C. Ti

D. Sn

**Answer: B**



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6. The most commonly used reducing agent is

A.  $AlCl_3$

B.  $PbCl_2$

C.  $SnCl_4$

D.  $SnCl_2$

**Answer: D**




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7. Cement, the important building material is a mixture of oxides of several elements. Besides calcium, iron and sulphur, oxides of elements of which of the group (s) are present in the mixture ?

- A. group 2
- B. groups 2, 13 and 14
- C. groups 2 and 13
- D. groups 2 and 14

**Answer: B**

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8. Match the species given in Column I with the hybridisation given in Column II. Itbvrgrt 7 

- A. N/A
- B. N/A

C. N/A

D. N/A

**Answer: A::B::C::D**

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9. Assertion (A) : Silicons are water repelling in nature.

Reason (R ) : Silicons are organosilicon polymers, which have  
(  $- R_2SiO -$  ) as repeating unit.

A. A and R both are correct and R is the correct explanation of A.

B. Both A and R are correct but R is not the correct explanation of A.

C. A and R both are not true.

D. A is not true but R is true.

**Answer: B**

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## Matrix Matching Type

1. Match the following columns

### **List -I**

- a) Red lead**
- b) Litharge**
- c) Galena**
- d) Cassiterite**

### **List -II**

- p) lead monoxide**
- q) An ore of lead**
- r) An ore of tin**
- s) Minium**

- A. a-r, b-s, c-p, d-q
- B. a-r, b-q, c-r, d-p,q
- C. a-s, b-p, c-q, d-r
- D. a-r, b-s, c-q, d-p

**Answer: C**



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2. Match the following columns

**List -I**

- a) Phosgene
- b) water glass
- c) CO
- d) CO<sub>2</sub>

**List -II**

- p) Sodium silicate
- q) A poisonous gas
- r) Fire extinguisher
- s) metal carbonyls

- A. a-q, b-p, c-s, d-r
- B. a-r, b-q, c-r, d p,q
- C. a-s, b-p, c-q, d-r
- D. a-r, b-s, c-q, d-p

**Answer: A**



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**List -1**

Arrange properly.

**A. Diamond**

**B. Graphite**

**C. Silica**

**D. CO<sub>2</sub>**

**List -2**

1. Metal electrode

2. sp hybridised

3. Acheson's process

4. Agate

5. Cutting of glass

3.

The correct match is

A. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
2	1	3	4

B. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
5	1	2	3

C. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
5	3	4	2

D. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
1	4	2	3

**Answer: C**



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### List -1

A. IVA group

B. Onyx

C. Lubricant

D. Hardest material

### List -2

1. Crystalline form

2. Amorphous form  
of silica

3. Graphite

4.  $ns^2 np^2$

5. Diamond

4.

The correct match is

A. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
2	4	3	5

B. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
2	3	5	4

C. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
4	2	3	5

D. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
5	3	2	4

Answer: C



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### List -1

- A.  $\text{SiCl}_4$
- B. Tetrahedral
- C. Acheson's process
- D.  $\text{SiO}_2$

5.

### List -2

- 1.  $\text{SiO}_2$
- 2. Acid-flux
- 3. Lewis Acid
- 4. Silicon
- 5. Graphite

The correct match is

A. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
1	2	4	3

B. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
5	1	2	4

C. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
3	1	5	2

D. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
3	2	4	1

Answer: C



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1. **List -I**

**A. Reactive form of Carbon**

**B. Acid employed for etching of glass**

**C. Synthesis gas**

**D. Unreactive form of Carbon**

**List -2**

**1. HF**

**2. Diamond**

**3. Charcoal**

**4. CO+H<sub>2</sub>**

The correct match is

**A B C D**

1) 1 2 3 4

3) 2 1 3 4

**A B C D**

2) 2 4 3 1

4) 3 1 4 2

6.

The correct match is

A. *A B C D*

1 2 3 4

B. *A B C D*

2 4 3 1

C. *A B C D*

2 1 3 4

D. *A B C D*

3 1 4 2

**Answer: D**



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7. Match the following: Column I (A)  $Si_2O_7^{6-}$  (B)  $(SiO_3^{2-})_n$  (C)  $(Si_2O_5)_n^{2n-}$  (D)  $SiO_2$

column II (P) cyclic silicate (q) Two dimensional silicate (r) three dimensional network (s) Pyrosilicate

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8. Match the following

**Column I**

A) Kaolinite

B) Chrysotile

C) Beryl

D) Thortveitite

**Column II**

p)  $Sc_2[Si_2O_7]$

q)  $Be_3Al_2[Si_6O_{18}]$

r)  $Mg_3(OH)_4[Si_2O_5]$

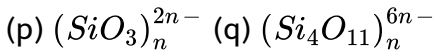
s)  $Al_2(OH)_4[Si_2O_5]$

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9. Match the following

- (A) Two dimensional sheet silicate
- (B) Pyroxene chain silicate
- (C) Pyro silicate (D) Amphibole chain silicate

Column II



(r) 3-corner oxygen atoms of each  $SiO_4^{4-}$  units are shared

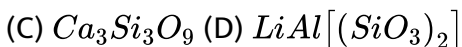
(s) non-planar



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10. Match the column:

Column I



Column II (p) Cyclic silicate (q) Chain silicate

(r) Each tetrahedron share two oxygens with other tetrahedron

(s) Sheet silicate

(r) Each tetrahedron share three oxygen atoms per tetrahedron with other tetrahedron.



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**11. Match the following:**

Column I

(A) Density (B) Melting point

(C) Electro negativity (D) Metallic charcter

Column II (p) Increases from carbon to lead

(q) Decreases from carbon to tin and then increases

(r) Decreases from diamond to silicon and then increases

(s) Decreases from carbon to silicon and then it is almost same

(t) Decrease from carbon to lead



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12. Match the following:

Column I

(A)  $CCL_4$  (B)  $SiF_4$  (C)  $PbH_4$  (D)  $SiCl_6^{-2}$

Column II

(p) Cannot be formed due to large size of surrounding anion.

(q) is a saturated compound

(r) is an unsaturated compound

(s) is a strong reducing agent

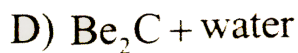
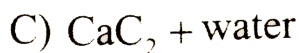
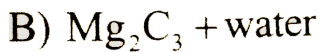
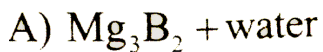
(t) is a strong oxidizing agent.



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13. Match the column

**Column I**



**Column II**

p) Produce methane

q) Produce alkyne

r) Produce electron deficient gas

s) Produce compound which is used as antacid drug

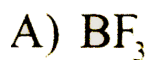
t) One of the product is amphoteric



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14. Match the following

**Column I**



**Column II**

p) Dimeric

q) Pyrene  
(vapour phase)

r) Tetrahedral

s)  $p\pi - p\pi$  back  
bonding

t) Lewis acid



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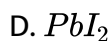
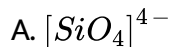
**Comprehension**

1. An aqueous solution of a salt (A) gives a white precipitate (B) with sodium chloride solution. The filtrate gives a black precipitate (C) when  $\text{H}_2\text{S}$  is passed into it. Compound (B) dissolves in hot water and the solution gives a yellow precipitate



(D) on treatment with sodium iodide. The compound (A) does gas on heating. Identify the compounds (A) to (D).

Compound A is :



**Answer: A**



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2. An aqueous solution of a salt (A) gives a white precipitate

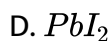
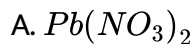
(B) with sodium chloride solution. The filtrate gives a black precipitate

(C) when  $H_2S$  is passed into it. Compound (B) dissolves in hot water and the solution gives a yellow precipitate

(D) on treatment with sodium iodide. The compound (A) does gas on

heating. Identify the compounds (A) to (D).

Compound B is :



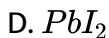
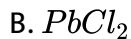
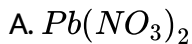
**Answer: B**



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3. An aqueous solution of a salt (A) gives a white precipitate (B) with sodium chloride solution. The filtrate gives a black precipitate (C) when  $H_2S$  is passed into it. Compound (B) dissolves in hot water and the solution gives a yellow precipitate (D) on treatment with sodium iodide. The compound (A) does gas on heating. Identify the compounds (A) to (D).

Compound C is :



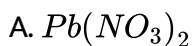
**Answer: C**



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4. An aqueous solution of a salt (A) gives a white precipitate (B) with sodium chloride solution. The filtrate gives a black precipitate (C) when  $H_2S$  is passed into it. Compound (B) dissolves in hot water and the solution gives a yellow precipitate (D) on treatment with sodium iodide. The compound (A) does gas on heating. Identify the compounds (A) to (D).

Compound D is :



B.  $PbCl_2$

C. PbS

D.  $PbI_2$

**Answer: D**



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5. A fibrous mineral which can withstand red hot flames without any damage is

A. Talc

B. Glass wool

C. Asbestos

D. Soap stone.

**Answer: C**



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6. The material used in solar cells contains

A. Cs

B. Si

C. Sn

D. Ti

**Answer: B**



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7. Which of the following halides is least stable and has a doubtful existence ?

A.  $Cl_4$

B.  $GeI_4$

C.  $SnI_4$

D.  $PbI_4$

**Answer: D**

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8. Silicon has a strong tendency to form polymers like silicones, the chain length of silicone polymer can be controlled by adding

A.  $MeSiCl_3$

B.  $Me_2SiCl_2$

C.  $Me_2SiCl$

D.  $Me_4Si$

**Answer: C**

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1. The metallic character of the element of IV A group

- A. Decreases from top to bottom
- B. Has no significance
- C. Does not change
- D. Increase from top to bottom

**Answer: D**



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2. Which of the following metals is an important ingredient of transistors

?

- A. Osmium
- B. Germanium
- C. Gold
- D. Sodium

**Answer: B**

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3. The reducing power of divalent species decreases in the order

A.  $Ge > Sn > Pb$

B.  $Sn > Ge > Pb$

C.  $Pb > Sn > Ge$

D. None of these

**Answer: A**

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4. The most commonly used reducing agent is

A.  $SnCl_4$



B. HF

C.  $\text{SnCl}_2$

D.  $\text{Cl}_2$

**Answer: C**

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5. The ionic chloride is

A.  $\text{Cl}_4$

B.  $\text{SiCl}_4$

C.  $\text{PbCl}_4$

D.  $\text{PbCl}_2$

**Answer: D**

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6. Diamond is a non conductor of electricity because

- A. There are no free electron
- B. Giant polymer structure
- C. High refractive index
- D. Its IP value is high

**Answer: A**



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7. Graphite is used as lubricant due to

- A. The slippery nature
- B. Its giant structure
- C. High refractive index
- D. High IP value of carbon

**Answer: A**

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**8.** Graphite is a good conductor of electricity due to

- A. Its giant tetrahedral polymer structure
- B. Its high refractive index
- C. Presence of free and mobile electrons
- D. High IP value of carbon

**Answer: C**

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**9.** Which property is common in diamond and graphite?

- A. Electrical conductivity

B. Crystal structure

C. Atomic weight

D. Density

**Answer: C**

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10. The hybridisation of carbon in carbon monoxide is

A.  $SP^3$

B.  $SP^2$

C. SP

D.  $dSP^2$

**Answer: C**

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11. An example of major air pollutant is

A.  $O_2$

B.  $CO_2$

C. CO

D. He

**Answer: C**



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12. CO can be used as a fuel but not  $CO_2$  because

A.  $CO_2$  is not a good fuel

B. CO is a good fuel

C. CO can be oxidized but not  $CO_2$

D.  $CO_2$  can be oxidized but not CO

**Answer: C**

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**13.** During day time plants absorb

A.  $CO_2$

B. CO

C.  $N_2$

D.  $O_2$

**Answer: A**

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**14.** Carbon dioxide dissolve under pressure in water to give:

A. An alkaline solution

- B. An acidic solution
- C. A neutral solution
- D. A highly alkaline solution

**Answer: B**



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**15. Carbogen is:**

- A. Mixture of  $O_2 + 5 - 10\% CO_2$
- B. used by pneumonia patients for respiration
- C. used by victims of CO for respiration
- D. All of these

**Answer: D**



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16. In  $H_2SiF_6$  the covalency of silicon is

A. 2

B. 4

C. 6

D. 8

**Answer: C**



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17. Silicones contain the following characteristics

A. Water repellent

B. Weak Si-C bonds

C. Si-Si bond

D. Less stable to heat



**Answer: A**

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18.  $SiO_4^{4-}$  is the basic structural unit in the following silicates

A. Quartz

B. Mica

C. Asbestos

D. All

**Answer: D**

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Level Iii H W

1. The first ionisation energies of the elements of group 14 follow the order.

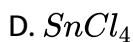
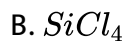


**Answer: A**



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2. Which of the following is not hydrolysed easily



**Answer: A**



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3. A)  $\text{Cl}_4$  does not act as lewis acid

B) Silanes are strong reducing agents

C) Crystalline silica will have Diamond like structure

The correct answer is

A. A & B are true

B. Only 'A' is true

C. Only 'B' is true

D. All are true

**Answer: D**



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4. A) Silanes are good reducing agents

B)  $SiO_2$  is a giant tetrahedral polymer

C)  $SnCl_4$  act as Bronsted Base

A. A and B are true

B. B and C are true

C. Only C is true

D. All are true

**Answer: A**



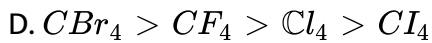
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5. The C-X bond energy order for carbon tetra halides is

A.  $CF_4 > CCl_4 > CBr_4 > CI_4$

B.  $Cl_4 > CBr_4 > CI_4 > CF_4$

C.  $CI_4 > CBr_4 > CCl_4 > CF_4$



**Answer: A**

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6. Which element can form the most acidic oxide

A. Carbon

B. Lead

C. Silicon

D. Germanium

**Answer: A**

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7. The correct statement with respect to CO is

- A. It combines with  $H_2O$  to give carbonic acid
- B. It reacts with haemoglobin in RBC
- C. It is a powerful oxidizing agent
- D. It is used to prepare aerated drinks

**Answer: B**

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8.  $CO_2$  and  $N_2$  are non-supporters of combustion. However for putting out fires  $CO_2$  is preferred over  $N_2$  because  $CO_2$

- A. Does not burn
- B. Forms non combustible products with burning substances
- C. Is denser than nitrogen
- D. Is a more reactive gas

**Answer: C**

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9. Which is correct regarding  $CO_2$ .

- A. Involves in photosynthesis
- B. Causes green house effect
- C. Dry ice is used as a refrigaerant for ice cream & frozen food.
- D. All of these

**Answer: D**

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10. Carbondioxide is used for extinguishing fire because

- A. It has a relatively high critical temperature
- B. In solid state, it is called dry ice
- C. It is neither combustible nor a supporter of combustion

D. It is a colourless gas

**Answer: C**

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11. Silica reacts with magnesium compound X, X reacts with dil HCl and forms Y and Z. If two moles of HCl reacts with one mole of X then how many mole of y will be formed

A. 4

B. 3

C. 2

D. 1

**Answer: D**

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12. Hydrolysis of  $SiCl_4$  gives compound 'X' and HCl on heating to  $1000^\circ C$

'X' loses water and forms 'Y'. Identify 'X' and 'Y' respectively.

A.  $SiO_2$  and Si

B.  $H_4SiO_4$  and  $SiO_2$

C.  $SiO_2$  and SiC

D.  $H_4SiO_4$  and SiC

**Answer: B**



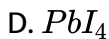
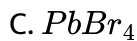
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### Level V Single Answer Type

1. Which of the following halides does not exist ?

A.  $PbF_4$

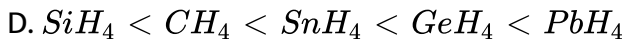
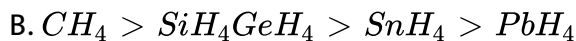
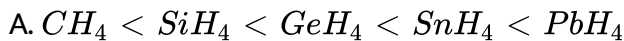
B.  $PbCl_4$



**Answer: D**

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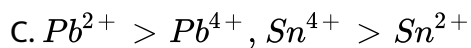
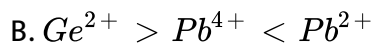
2. Which of the following is the correct order of reducing power of hydrides ?



**Answer: A::B::C::D**

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3. Select correct order about stability of cations



D. All are correct statements

Answer: D



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4. Dangling bonds are not present in

A. Diamond

B. Fullerenes

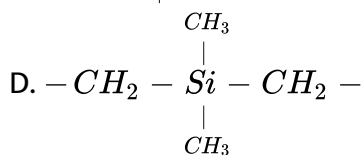
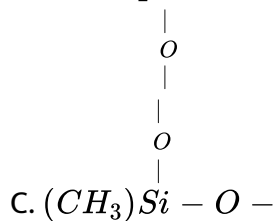
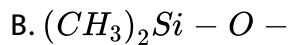
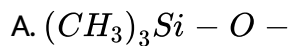
C. Graphite

D. Silica

Answer:

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5. Which of the following is cross link formation linkage in silicones ?



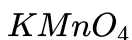
Answer: C

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6. Which of the following is incorrect statement ?

A. Graphite is thermodynamically more stable than diamond

B. Graphite is oxidized to mellitic acid when treated with alkaline



C. Diamond is chemically inert than graphite

D.  $Sn^{+2}$  ion is more stable than  $Pb^{+2}$ )

**Answer: D**



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7. Consider following statements :

I: In diamond, each carbon atom by  $sp^3$  bonds

II : Graphite has planar hexagonal layers of carbon atoms held together by weak van der Walls forces

III: Silicon exists only in diamond structure due to its tendency to form  $p\pi - p\pi$  bonds to itself. In this:

- A. Only I and II are correct
- B. Only I is correct
- C. Only II and III are correct
- D. All are correct statements

**Answer: A::B::C::D**

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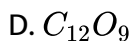
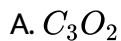
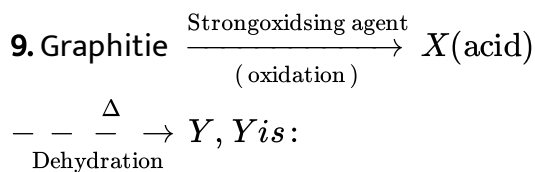
**8. Which of the following statements is correct ?**

- A. Graphite is thermodynamically more stable than diamond
- B. Diamond is thermodynamically more stable than graphite
- C. Graphite has such a high thermodynamically stability that diamond spontaneously changes into graphite under ordinary conditions.
- D. Graphite and diamond have equal thermodynamic stability.

**Answer: A::B::C::D**



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Answer: D



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10. Graphite is a soft solid lubricant extremely difficult to melt. The reason for this anomalous behaviour is that graphite

A. is a non - crystalline substance

B. is an allotropic form of diamond

C. has molecules of variable molecular masses like polymers

D. has carbon atoms arranged in large plates of rings of strongly bonded carbon atoms with weak inter-plate bonds.

**Answer: D**

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**11. Which of the following is incorrect about graphite ?**

A. forms intercalation compounds with alkali metals

B. thermodynamically more stable than diamond

C. is paramagnetic due to delocalised  $\pi$  - electron cloud

D. thermal conductivity is more than diamond.

**Answer: C**

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12. Which of the following is incorrect statement ?

- A. A silicon forms a number of compounds containing  $p\pi - d\pi$  bond
- B. C - si bond is almost 50% ionic and 50% covalent
- C. Silica gel is crystalline solid used in chromatography
- D. Kieselguhr is one form of  $SiO_2$

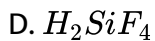
**Answer:**



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13. Silicon dissolves in excess of HF due to formation of

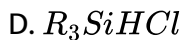
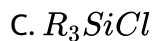
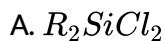
- A.  $SiF_4$
- B.  $SiH_4$
- C.  $H_2SiF_6$



Answer: C

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14. Which of the following type of compound is used to increase the hardness of the silicone polymer ?



Answer:

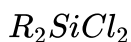
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15. Which is incorrect statement about silicones ?

A. they are repeating units ( $SiO_4$ ) in silicates

B. they are synthetic polymers containing repeated  $R_2SiO$  units

C. They are formed by hydrolysis and on subsequent polymerisation of



D. silicones are used as a lubricants

Answer: A::B::C::D



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16. Silicones are a group of organosilicon polymers containing\_\_\_\_\_ linkages.

A. Si- O -Si linkages

B. Si OSi linkages

C. Si- O- Si linkages

D. O- Si- Si -O linkages

**Answer: A::B::C::D**

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17. Find out ratio of alkylgroup, silicon and chlorine in alkyl substituted chloro silicon which is used in formation of cyclic silicones which have four oxygen atom

A. 1: 1: 1

B. 2: 2: 1

C. 2: 1: 2

D. 1: 1: 2

**Answer: C**

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18. Silicones repel water due to:

- A. the presence of alkyl group pointed towards surface
- B. strong Si-O-Si bonds
- C. low surface area
- D. high vander Waals' forces

Answer: A::B::C::D

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19. The correct order of increasing  $C - O$  bond length of  $CO$ ,  $CO_3^{2-}$ ,  $CO_2$  is

- A.  $CO_3^{2-}$ ,  $CO_2$ ,  $CO$
- B.  $CO_2$ ,  $CO_3^{2-}$ ,  $CO$
- C.  $CO$ ,  $CO_3^{2-}$ ,  $CO_2$
- D.  $CO$ ,  $CO_2$ ,  $CO_3^{2-}$

**Answer: D**

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20. On heating  $K_4[Fe(CN)_6]$  with concentrated  $H_2SO_4$ , the product formed will be

A. CO

B. HCN

C.  $CO_2$

D.  $(CN)_2$

**Answer: A::B::C::D**

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21. Which statement is false :

- A. Water gas is a mixture of hydrogen and carbon monoxide
- B. Producer gas is mixture of carbon monoxide and nitrogen
- C. Water gas is a mixture of water vapour and hydrogen
- D. Natural gas consists of methane, ethane and gaseous hydrocarbons

**Answer: C**

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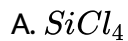
**22.** Carbon suboxide  $C_3O_2$  may be obtained by heating :

- A. Maleic acid with  $P_4O_{10}$
- B. Malonic acid with  $P_4O_{10}$
- C. Oxalic acid strongly
- D. None of these

**Answer:**

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23. Pyrene (a fire extinguisher) is



**Answer:**



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24. Chemically zeolites are

A. Aluminium silicate

B. Calcium aluminosilicate

C. Hydrated sodium aluminosilicate



D. Alkyl silicates

**Answer: C**



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25.  $SiO_2$  can be dissolved in

A.  $HNO_3$

B. HF

C.  $H_2SO_4$

D. HCl

**Answer:**



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26. in silicon dioxide :

- A. Each silicon atom is surrounded by four oxygen atoms and each oxygen atom is bonded to two silicon atoms.
- B. Each silicon atom is surrounded by two oxygen atoms and each oxygen atom is bonded to two silicon atoms.
- C. Silicon atom is bonded to two oxygen atoms
- D. There are double bonds between silicon and oxygen atoms.

**Answer: A::B::C::D**



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**27. Purest form of silica is**

- A. Quartz
- B. Flint
- C. Sand stone
- D. Keiselguhr

Answer: A::B::C::D



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28. When  $SiO_2$  reacts with sodium carbonate, the gas evolved is

A.  $CO_2$

B.  $O_2$

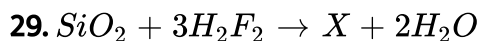
C. CO

D.  $O_3$

Answer: A::B::C::D



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During the formation of X an intermediate product Y is formed.

Hybridisation of central atom in X and Y respectively :

A.  $sp^3d^2$ ,  $sp^3$

B.  $sp^3d$ ,  $sp^3d^2$

C.  $sp^3d$ ,  $sp^2$

D.  $sp^3d^2$ ,  $sp^2$

**Answer: A::B::C::D**

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**30.** Trisilyamine ( $SiH_3$ )<sub>3</sub> N is

A. trigonal pyramidal and acidic

B. trigonal pyramidal and basic

C. trigonal pyramidal and neutral

D. trigonal planar and weakly basic

**Answer: D**

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31. In  $SiF_6^{-2}$  because of small size of F

A.  $SiF_6^{-2}$  because of small size of F

B.  $SiF_6^{-2}$  because of large size of F

C.  $SiCl_6^{-2}$  because of small size of Cl

D.  $SiCl_6^{-2}$  because of large size of Cl

Answer: A::B::C::D



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32. In sheet silicate number of oxygen atoms involved in sharing are

A. 2

B. 3

C. 4

D. 0

**Answer:**



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**33.** The name of the structure of silicates in which three oxygen atoms of  $[SiO_4]^{4-}$  are shared is

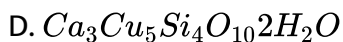
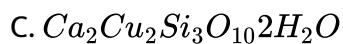
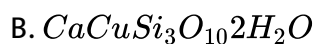
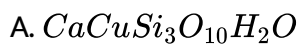
- A. Pyro Silicate
- B. two dimensional Sheet silicate
- C. Linear chain silicate
- D. three dimensional silicate

**Answer:**



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34. The silicate ion in the mineral kinoite is a chain of three  $SiO_4^{4-}$  tetrahedral that share corners with adjacent tetrahedral. The mineral also contains  $Ca^{2+}$  ions,  $Cu^{2+}$  ions and water molecules in 1:1:1 ratio. The mineral is represented as



**Answer: C**

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35. The silicate anion in the mineral kinoite is a chain of three  $SiO_4$  tetrahedra, that share corners with adjacent tetrahedra. The charge of silicate anion is

A.  $-8$

B.  $-4$

C.  $-6$

D.  $-2$

**Answer: A::B::C::D**



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**36.** Amphibole silicate structure has 'x' number of corner shared per tetrahedron. The value of x is :

A. 3

B. 4

C.  $2\frac{1}{2}$

D. 2

**Answer: C**



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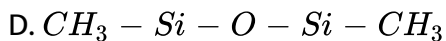
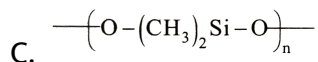
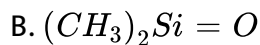
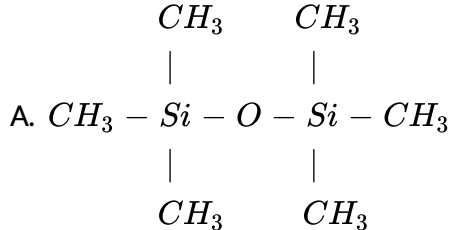
37.  $\text{Cl}_4$  is stable towards hydrolysis in water whereas  $\text{SiCl}_4$  is easily hydrolysed by water because

- A. carbon is more electropositive than silicon
- B.  $\text{Cl}_4$  is covalent whereas  $\text{SiCl}_4$  is ionic
- C. Silicon has a 3d orbital available for further coordination with water whereas carbon has no dorbital for bonding
- D.

**Answer: C**

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38.  $(\text{CH}_3)_2\text{SiCl}_2$  on hydrolysis and on subsequent polymerisation will produce :



**Answer: C**



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**39. Silly putty is**

A. Silicate

B. Silicon polymer

C. silicon boride

D. one form of silicon

**Answer:**

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**40.** Water glass is:

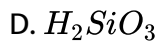
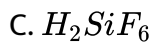
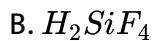
- A. Calcium silicate
- B. Sodium calcium silicate
- C. Sodium silicate
- D. Magnesium silicate

**Answer: C**

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**41.** The phenomena 'etching' on glass is due to the formation of

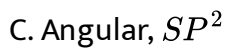
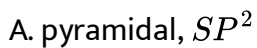
- A.  $SiF_4$



**Answer: C**

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**42.** The structure and hybridisation of Si in  $Si(CH_3)_4$  is



**Answer:**

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43. Which of the following is used for the absorption of CO?

A. Conc.  $H_2SO_3$

B. Cone. KOH

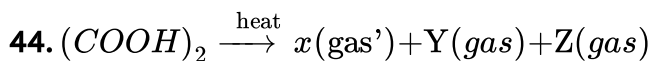
C. Ammonical solution of  $AgNO_3$

D. Ammonical solution of CuCl

Answer: D



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$Y$  and  $Z$  both are polar and neutral,  $X$  is non polar and acidic.  $Z$  gas is condensed and formed liquid having  $ph = 7$ . The hybridization state of  $X$ ,  $Y$  and  $Z$  are respectively

A.  $sp$ ,  $sp^2$ ,  $sp^3$

B.  $sp^2$ ,  $sp^2$ ,  $sp^3$ ,  $d$

C.  $sp$ ,  $sp^3$ ,  $sp^3$

D.  $sp$ ,  $sp$ ,  $sp^3$

**Answer: D**



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**45.** Which of the following statement is correct ?

A. C - F bond is stronger than Si - F because C-F bond length is shorter than that of Si-F

B. C - F bond is weaker than Si - F bond because of less difference in electronegativity

C. Si - F bond is stronger than C - F bond because of double bond character due to back bonding from F to Si.

D. Si - F bond is stronger than C - F bond due to more difference in electronegativities.

**Answer: C**

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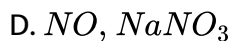
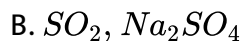
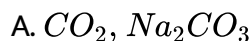
46.  $H_2SO_4$  is not used for preparation of  $CO_2$  from marble chips because

- A. it does not react
- B. huge amount of heat is evolved
- C. the reaction is vigorous
- D. calcium sulphate formed is sparingly soluble and gets deposited on marble chips which stops further reaction

**Answer: D**

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47. On heating potassium ferrocyanide with concentrated sulphuric acid produces a neutral gas A. The gas A on treatment with caustic soda under high pressure produced B. What are A and B respectively.

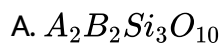


**Answer: C**

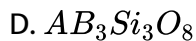
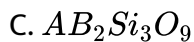
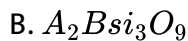


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48. A silicate anion in a mineral is a linear chain of three silicate tetrahedral units that share at corners. The silicate mineral contains  $A^{2+}$  and  $B^{2+}$  ions. The formula of that mineral is



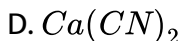
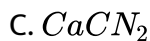




**Answer: A::B::C::D**

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49. \_\_\_\_ is the compound which can remove both oxygen and nitrogen of the air when passed over it at  $1000^\circ C$  ?



**Answer: A::B::C::D**

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50. Select incorrect statement ?

- A. Mellitic acid is benzene hexa - carboxylic acid
- B. Pb reacts with HI to form  $PbI_4$
- C. Pb dissolves in acid as well as in base
- D. Diamond is unreactive but graphite forms  $(CF)_n$  With  $F_2$

**Answer:**

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51.  $C_{60}$  (fullerene) has the shape of a soccer ball, consider the following statements :

- I. Fullerene is an allotrope of carbon
- II. Fullerece has 5 and 6 membered rings
- III. All carbons in fullerene are  $sp^2$  hybridised.

Identify the correct statements :

A. I only

B. III only

C. I, II and III

D. I and II only

**Answer: C**



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**52.** Which of the following occurs as a consequence of inert pair effect ?

- a)  $\text{SnCl}_2$  acts as a reducing agent
- b)  $\text{SnCl}_4$  acts as an oxidising agent
- c)  $\text{SnO}_2$  is amphoteric
- d)  $\text{PbO}_2$  is an oxidant
- e)  $\text{Cl}_2$  is unstable but  $\text{PbCl}_2$  is stable

A. a,d,e

B. d,e

C. a,b,c,d,e

D. a,b,c

**Answer:**



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**53.** In the following sub questions, choose the correct answer from among the following possibilities and select correct code of your answer

(Answer of 1, 2, 3 and 4 respectively)

1) the most stable low valent halide (1)  $GeCl_2$  (2)  $SnCl_2$  (3)  $PbCl_2$ .

2) A non existing halide (1)  $SnCl_4$  (2)  $PbCl_4$  (3)  $PbI_4$

. 3) A purely acidic oxide (1)  $PbO_2$  (2)  $SnO_2$  (3)  $SiO_2$

4) Thermally most stable hydride (1)  $NH_3$  (2)  $PH_3$  (3)  $AsH_3$ .

A. 3, 2, 1, 3

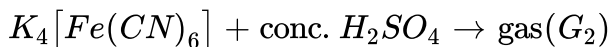
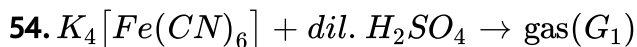
B. 1, 3, 3, 1

C. 3, 3, 3, 1

D. 1, 1, 1, 3

**Answer: C**

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gas  $G_1$  and  $G_2$  are respectively.

A.  $CO, CO_2$

B.  $HCN, CO$

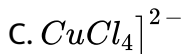
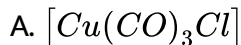
C.  $HCN, HNC$

D.  $HCN, CO_3$

**Answer:**

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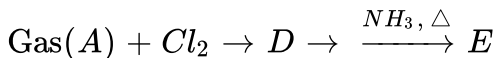
55. Which of the following is formed when CO is absorbed in cuprous chloride in ammonia solution ?



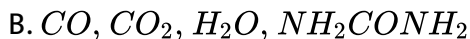
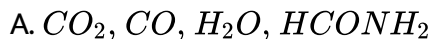
**Answer:**

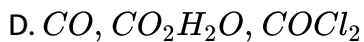
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56.  $H_2C_2O_4 \xrightarrow{\Delta} \text{gas}(A) + \text{gas}(B) + \text{liquid}(C)$ . Gas(A) burns with a blue flame and is oxidised to gas(B).



A,B,C and E are

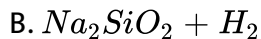
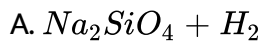




**Answer: C**

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57. Carborundum on heating with caustic soda in presence of air produces



**Answer: D**

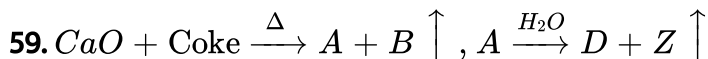
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58. The species present in solution when  $CO_2$  is dissolved in water is/are:

- A. only  $H_2CO_3$
- B.  $CO_2, H_2CO_3, HCO_3^- , CO_3^{2-}$
- C. only  $H_2CO_3, HCO_3^-$
- D. only  $CO_2, H_2CO_3$

Answer:

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Then the incorrect statement is :

- A. Gas B burns with blue flame
- B. A is an ionic carbide
- C. A is called methanide
- D. Z is acetylene gas



**Answer: C**

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## Multiple Answer Type

1. Which of the following statements are correct ?

- A. Graphite is thermodynamically more stable than diamond
- B.  $\alpha$  - graphite has layers arranged as ABAB sequence
- C.  $\beta$  - graphite has layer arranged as ABCABC sequence
- D. The number of C-atoms per unit lattice of diamond is 8.

**Answer: A::B::C::D**

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2. Which of the following is true about allotropes of Carbon ?

- A. Graphite a good conductor of electricity because free electrons are spread out in the structure and the adjacent layers are held by weak Vander Waals forces.
- B. In C-60, there are 12 pentagonal and 20 hexagonal faces
- C. Graphite is thermodynamically more stable than diamond
- D. In diamond each carbon undergoes  $SP^3$  hybridisation and is three dimensional.

**Answer: A::B::C::D**

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3. Which of the following statement (s) is/are true ?

- A. The lattice structure of diamond and graphite are different
- B. Graphite is thermally more stable than diamond
- C. Graphite is harder than diamond

D. Graphite is an impure form of carbon while diamond is a pure form

**Answer: A::B**

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4. Which of the following statement (s) is/are correct regarding graphite and inorganic graphite ?

A. All atoms in graphite as well as inorganic graphite are  $sp^2$  hybridised.

B. Graphite is not having any charge separation like inorganic graphite.

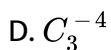
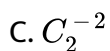
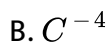
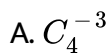
C. Both are slippery in nature

D. Both are conducting electricity but graphite is less conducting in nature compared to inorganic graphite.

**Answer: A::B::C**

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5. The one which is/are regarded as ionic carbide (s):



**Answer: B::C::D**

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6. Which of the following statement(s) is/are correct

A. Carborundum and Boron carbides are true covalent compounds

B.  $Al_4C_3$  and  $Be_2C$  are ionic carbides and evolve methane on hydrolysis

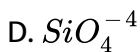
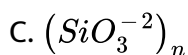
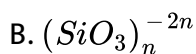
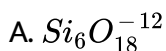
C.  $Al_4C_3$  and  $Be_2C$  contain  $C^{-4}$  units and evolve methane and acetylene respectively on hydrolysis

D. Carborundum is used as abrasive

**Answer: A::B::D**

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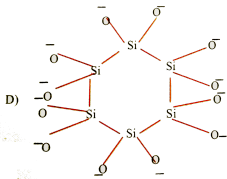
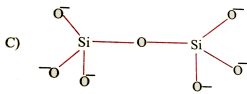
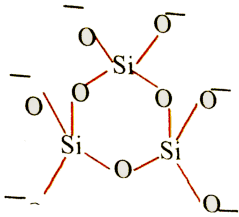
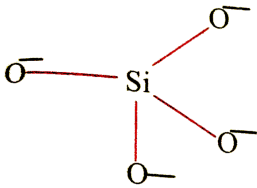
7. Which of the following have cyclic silicate structures ?



**Answer: A::B::C**

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8. Which of the following do not represent pyrosilicates ?



Answer: A::B::D



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9. Which of the following statements are correct ?

A.  $SiCl_4$  has low boiling point than  $Cl_4$

B. The stability order of crystalline allotropes of carbon is : Graphite

> Diamond > Fullerene

C. Silicon exhibit more catenation power in its halogen compounds than in its hydrides

D. Fake diamonds can be identified by the measurement of thermal conductivity

**Answer: A::B::C::D**



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10. Silicones are group of organo silicon polymer, select correct statement (s) about them.

A.  $R_3SiCl$  produce very complex cross linked polymeric silicones on hydrolysis

B. Their water repellency arises because silicone chain is surrounded by organic side groups

C. Their strength and inertness are related to their stable silica like skeleton of  $-\overset{|}{Si}-O-\overset{|}{Si}-O-\overset{|}{Si}-$

D. Hydrolysis product of  $CH_3SiCl_3$  will block the end of the straight chain produce by hydrolysis of  $(CH_3)_2SiCl_2$

**Answer: B::C**



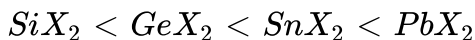
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11. Which of the following statement is/are correct regarding the compounds of carbon family elements ?

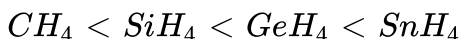


A. Maximum co-ordination number of carbon is commonly occurring compounds is 4, whereas that of silicon is 6.

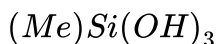
B. The stability order of group 14 dihalides is



C. The order of boiling point of hydrides of group 14 element is



D.  $MeSiCl_3$  on hydrolysis and subsequent condensation will produce



**Answer: A::B::C**

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12. Which of the following is/are correctly matched ?

A.  $Be_3Al_2[Si_6O_{18}]$ -cyclic silicate

B.  $Be_2[SiO_4]$ - neso silicate

C.  $Si_2O_7^{2-}$  - pyrosilicate

D.  $Ca_3[Si_3O_9]^{2-}$  - cyclic silicate

Answer: A::B::C::D

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13. Incorrect statements about silicates ?

A. Sorosilicate has  $(Si_2O_7)^{6-}$  unit

B. Spodumene is a silicate ore of lithium has  $(Si_2O_5)^{n-}$   $(2n - )$

C. Amphiboles contain OH groups bonded to silicate ion

D. Three oxygen atoms of  $SiO_4^{4-}$  tetrahedral units are shared in cyclic silicates.

Answer: B::C::D

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14. Select the correct statement about silicates ?

- A. Cyclic silicate having three Si atoms contain six  $Si - O - Si$  linkages
- B.  $2\frac{1}{2}$  oxygen atoms per tetrahedron unit are shared in double chain silicate
- C.  $(Si_2O_5)_n^{2n-}$  is formula of double chain silicate
- D.  $SiO_4^{4-}$  units polymerise to form silicate because Si atom has less tendency to form  $\pi$  - bond with oxygen

Answer: B::D



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15. Which one of the following is/are correct statement (s) ?

- A. In willemite  $Zn_2[SiO_4]$  and phenacite  $Be[SiO_4]$ , the Zn and Be atoms have a coordination number of 4
- B. In forsterite  $Mg_2[SiO_4]$  the Mg has a coordination number of 6
- C. Ultramarine -  $Na_8[(AlSiO_4)_6]S_2$
- D. Sodalite -  $Na_8[(AlSiO_4)_6]Cl_2$

**Answer: A::B::C::D**

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**16.** Under hydrolysis conditions, the compounds used for preparation of linear polymer and for chain termination, respectively are

- A.  $CH_3SiCl_3$  and  $Si(CH_3)_4$
- B.  $(CH_3)_2SiCl_2$  and  $(CH_3)_3SiCl$
- C.  $CH_3SiCl_2$  and  $CH_3SiCl_3$
- D.  $SiCl_4$  and  $(CH_3)_3SiCl$

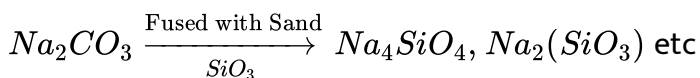
Answer: B



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## Comprehension Type

1. Silicates are metal derivatives of silicic acid. Silicates are formed by heating metal oxide or metal carbonate with sand.



A silicate in general has Si-O bond and possesses a complex network solid having silicate ion  $SiO_4^{4-}$  as the basic structural unit. These silicates occurs singly or by sharing oxygen atom is small occurs singly or by sharing oxygen atom is small groups, in cyclic groups, in infinite chains or infinite sheets giving different structures to silicates such as chain silicates, ring silicates, cyclic silicates, sheet silicates, three dimensional silicates etc.,

The general formula  $(SiO_3^{2-})_n$  forms

A. ortho silicates

B. pyro silicates

C. cyclic silicates

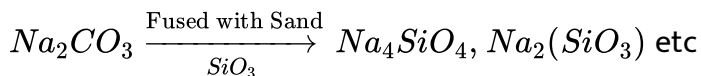
D. three dimensional silicates

**Answer: C**



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2. Silicates are metal derivatives of silicic acid. Silicates are formed by heating metal oxide or metal carbonate with sand.



A silicate in general has Si-O bond and possesses a complex network solid having silicate ion  $SiO_4^{4-}$  as the basic structural unit. These silicates occurs singly or by sharing oxygen atom is small occurs singly or by sharing oxygen atom is small groups, in cyclic groups, in infinite chains or infinite sheets giving different structures to silicates such as chain silicates, ring silicates, cyclic silicates, sheet silicates, three dimensional

silicates etc.,

Number of oxygen atoms in pyrosilicate is

A. 8

B. 7

C. 6

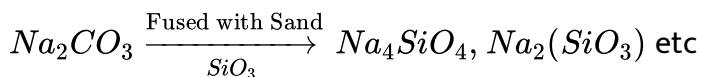
D. 5

**Answer: B**



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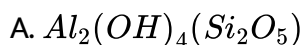
3. Silicates are metal derivatives of silicic acid. Silicates are formed by heating metal oxide or metal carbonate with sand.



A silicate in general has Si-O bond and possesses a complex network solid having silicate ion  $SiO_4^{4-}$  as the basic structural unit. These silicates occurs singly or by sharing oxygen atom is small occurs singly or by sharing oxygen atom is small groups, in cyclic groups, in infinite chains or

infinite sheets giving different structures to silicates such as chain silicates, ring silicates, cyclic silicates, sheet silicates, three dimensional silicates etc.,

Which of the following is ortho silicate ?



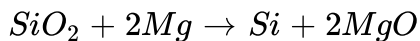
**Answer: D**

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4. Silicon. The element silicon has two allotropic modification (a) Amorphous silicon (b) Adamantine silicon. A third allotropic modification has been observed and is of doubtful character known as graphitoidal silicon. Amorphous silicon is obtained by heating well-powdered quartz of finely silica with magnesium powder in a fireclay which is suitable for the



manufacture of crucibles.



The product is washed with dilute HCl to wash away MgO and then with hydrofluoric acid to remove uncharged silica.

Crystalline silicon may be obtained by heating potassium silicon fluoride with

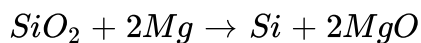
- A. Al
- B. C
- C. Zn
- D. Both (A) and (C)

**Answer: D**

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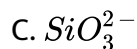
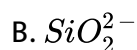
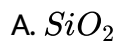
5. Silicon. The element silicon has two allotropic modification (a) Amorphous silicon (b) Adamantine silicon. A third allotropic modification has been observed and is of doubtful character known as graphitoidal

silicon. Amorphous silicon is obtained by heating well-powdered quartz of finely silica with magnesium powder in a fireclay which is suitable for the manufacture of crucibles.



The product is washed with dilute HCl to wash away MgO and then with hydrofluoric acid to remove uncharged silica.

Silicon reacts with fused aqueous NaOH to form



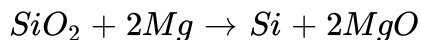
**Answer: C**



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6. Silicon. The element silicon has two allotropic modification (a) Amorphous silicon (b) Adamantine silicon. A third allotropic modification

has been observed and is of doubtful character known as graphitoidal silicon. Amorphous silicon is obtained by heating well-powdered quartz of finely silica with magnesium powder in a fireclay which is suitable for the manufacture of crucibles.



The product is washed with dilute HCl to wash away MgO and then with hydrofluoric acid to remove uncharged silica.

When silica is heated with carbon then silica is reduced to

A. Si

B. SiO

C.  $\text{SiO}_3^{2-}$

D. SiC

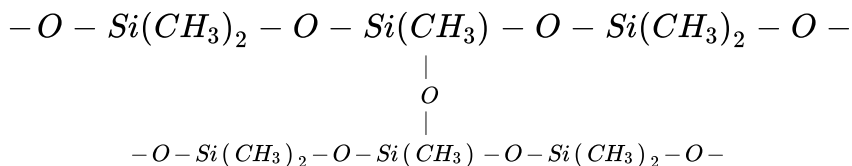
**Answer: D**



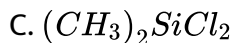
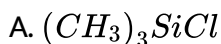
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7. The silicons are organosilicon polymers containing  $Si - O - Si$  linkage.

They are usually prepared by hydrolysis of alkylchlorosilanes, the silanols formed as intermediates on hydrolysis condense by intermolecular elimination of water with the formation of  $Si - O - Si$  linkage



The above silicone can be obtained by hydrolysis of which of the following ?



**Answer: D**



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8. The silicons are organosilicon polymers containing  $Si - O - Si$  linkage. They are usually prepared by hydrolysis of alkylchlorosilanes, the silanols formed as intermediates on hydrolysis condense by intermolecular elimination of water with the formation of  $Si - O - Si$  linkage

Which of the following is not the property of silicone?

- A. They are thermally stable
- B. They are having high volatility
- C. They are having water repellent property
- D. They are electric insulators

**Answer: B**



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9. The silicons are organosilicon polymers containing  $Si - O - Si$  linkage. They are usually prepared by hydrolysis of alkylchlorosilanes, the silanols formed as intermediates on hydrolysis condense by intermolecular

elimination of water with the formation of  $Si - O - Si$  linkage

To get the silicone of

$R_3Si - (OSiR_2)_n - SiR_3$ , having 4 SiO-Si linkage, the unit taken is

A. 3 unit of  $R_3SiCl$  and 2 unit  $R_2SiCl_2$

B. 3 unit of  $R_2SiCl_2$  and 2 unit  $R_3SiCl$

C. 2 unit of  $R_2SiCl_2$  and 2 unit  $R_3SiCl$

D. 4 unit of  $R_3SiCl_2$  and 2 unit  $R_3SiCl$

**Answer: B**



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**10.** The vast majority of silicates are insoluble in water, except alkali metal silicate. The extreme stability of silicates is due to the donation of extra electrons from O atoms into the vacant 3d-orbital of Si. The  $SiO_4$  tetrahedral units may occur singly or may share one, two, three or four O atoms through corners giving rise to cyclic groups, chains infinite layers of

infinite three dimensional frame work.

Anion  $Si_3O_9^{x-}$  present in beniotite. Then x is

A. 5

B. 6

C. 7

D. 12

**Answer: B**



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**11.** The vast majority of silicates are insoluble in water, except alkali metal silicate. The extreme stability of silicates is due to the donation of extra electrons from O atoms into the vacant 3d-orbital of Si. The  $SiO_4$  tetrahedral units may occur singly or may share one, two, three or four O atoms through corners giving rise to cycle groups, chains infinite layers of infinite three dimensional frame work.

Select incorrect option for  $(Si_4O_{11})_n^{6n-}$

- A. It is the formula of double chain silicate
- B. It is the formula of double chain silicate
- C. It is non planar polymeric anion
- D. Each silicon is surrounded by 2.5 oxygen

**Answer: C**

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## Statement Type

1. Assertion:  $C_3O_2$  has linear structure.

Reason: Each carbon atom in  $C_3O_2$  is  $sp$ -hybridized.

- A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I
- B. Statement-I is True, Statement-II is True : Statement-II is *NOT* a correct explanation for Statement-I



C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

**Answer: A**

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2. Between  $\text{SiCl}_4$  and  $\text{CCl}_4$ , only  $\text{SiCl}_4$  reacts with water.

$\text{SiCl}_4$  is ionic and  $\text{CCl}_4$  is covalent.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is *NOT* a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

**Answer: C**

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3. Statement-I:  $CO_2$  is a gas, while  $SiO_2$  is solid

Statement-II: Carbon has no vacant 'd' orbitals but silicon has.

- A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I
- B. Statement-I is True, Statement-II is True : Statement-II is *NOT* a correct explanation for Statement-I
- C. Statement-I is True, Statement-II is False.
- D. Statement-I is False, Statement-II is True.

**Answer: B**

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4. Statement-I:  $SiF_6^{-2}$  is known but  $SiCl_6^{-2}$  is not known

Statement-II: Interaction of 'F' lone pair electrons with 'Si' is stronger than that of chlorine and due to smaller size of 'F' steric repulsion will be less.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is *NOT* a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

**Answer: A**



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5. Statement-I: Carbonate and silicate are isostructural.

Statement-II: Carbon and silicon have same number of valence electrons

- A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I
- B. Statement-I is True, Statement-II is True : Statement-II is *NOT* a correct explanation for Statement-I
- C. Statement-I is True, Statement-II is False.
- D. Statement-I is False, Statement-II is True.

**Answer: D**

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6. Statement-I:  $(CH_3)_3SiCl$  produces polymeric silicons on hydrolysis and followed by condensation

Statement-II: Silicon does not form  $Si=O$  due to less effective lateral overlapping of  $3p-2p$  orbitals

- A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

- B. Statement-I is True, Statement-II is True : Statement-II is *NOT* a correct explanation for Statement-I
- C. Statement-I is True, Statement-II is False.
- D. Statement-I is False, Statement-II is True.

**Answer: D**

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7. Statements-I: Diamond is extremely hard and non volatile substance  
Statement-II: In diamond strong C-C bonding is present throughout the crystal.
- A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I
- B. Statement-I is True, Statement-II is True : Statement-II is *NOT* a correct explanation for Statement-I
- C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

**Answer: A**

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8. Statement-I: The value of  $x$  of  $(Si_4O_{12})^{x-}$  is 8

Statement-II: In  $[Si_4O_{12}]^{x-}$  every  $SiO_4$  tetrahedra unit having 2 oxygen shared and 2 oxygen unshared.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is *NOT* a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

**Answer: A**



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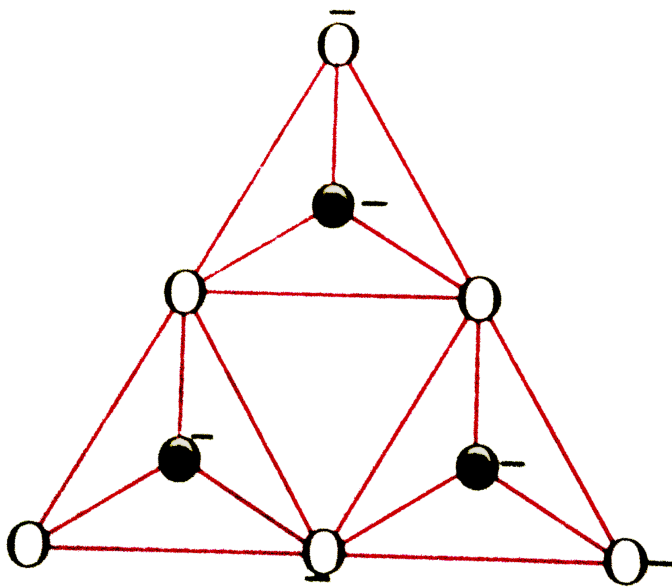
## Integer Type

1. How many oxygen atoms are expected to be shared by each  $SiO_4^{4-}$  tetrahedra to form a cyclic silicate ion  $Si_3O_9^{6-}$



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2. One of the calcium silicates is called Wollastonite. The silicate present in the mineral has a plane projection structure as follows.



What is the positive charge that has to be provided to compensate the negative charge of silicate.

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3. Number of oxygen atoms in pyrosilicate is

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4. What is the maximum covalency for silicon?

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5. The number of corner of O atom shared per tetrahedron in 2D silicate is \_\_\_\_\_

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6. The following compound  $(CH_3)_nSi(Cl)_{4n}$  on hydrolysis and on subsequent polymerisation gives a branched chain silicone. What is the value of n?

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7. Number of moles of free electrons responsible for electrical conductance of 12 g of graphite are

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8. Number of oxides possible for carbon at normal conditions is

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9. Number of bonding electrons present in one molecule of neutral oxide of 'C' is

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10. In  $C_{60}$  'x' number of 6 membered rings are present and 'y' number of 5 membered rings are possible then the difference of  $x$  &  $y$  is/are

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11. Maximum no. of 'O' atoms are bonded with each Si in  $SiO_2$ .

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12. Sum of the number of oxygen shared in between two silicon atoms in

$Si_3O_9^{6-}$  and  $Si_3O_{10}^{8-}$  is:

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13. Consider the following silicates

(a)  $BaTi(Si_2O_9)$

(b)  $ZnCa_2Si_2O_7$

Then calculate X+Y, where X and Y are total number of monovalent and divalent oxygen atoms in both silicates respectively.

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14. Consider following three compounds:

(i)  $C_xO_y$  (ii)  $C_xO_{y+1}$  (iii)  $C_{x+2}O_{y+1}$

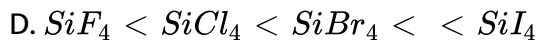
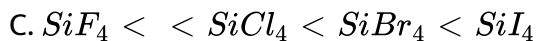
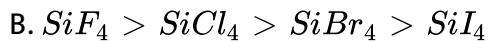
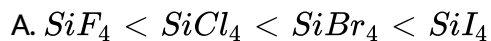
If  $x = y = 1$ , then calculate the value of  $|p - q|$ , where p and q are total number of  $sp^2$  and sp hybridised carbon atoms respectively in given three compounds.



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## Single Answer Type Questions

1. The correct order of thermal stability of silicon tetrahalides is



Answer: B



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2. The number of  $C - C$  linkages in  $C_{60}$  (Fullerene) is

A. 60

B. 90

C. 180

D. 240

**Answer: B**

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3. The hybridization state of nitrogen atoms in the molecules  $(SiH_3)_3N$  and  $(CH_3)_3N$  are

A. both  $sp^3$

B. respectively  $sp^2$  and  $sp^3$

C. respectively  $sp^3$  and  $sp^2$

D. both  $sp^2$

**Answer: B**

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4. Which of the following is correct about silicones ?

A. Silicones are organo silicon compounds containing  $Si = O = Si$  linkage

B.  $R_3SiCl$  on hydrolysis and on subsequent polymerisation gives linear silicones

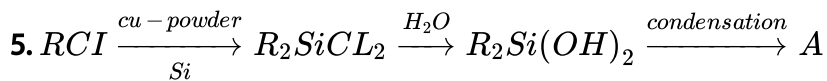
C. When water is eliminated from the terminal  $-OH$  groups of linear silicones, cross linked silicones are formed

D.  $RSiCl_3$  on hydrolysis and on subsequent polymerisation gives cross linked silicones

**Answer: D**



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Compound (A) is

- A. a linear silicone
- B. a chlorosilane
- C. a linear silane
- D. a network silicon

**Answer: A**



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6. The compound  $(CH_3)_mSi(Cl)_n$  on hydrolysis and on subsequent polymerisation gives cross linked silicone, then 'm' and 'n' are respectively

- A. 1 and 3
- B. 1 and 2
- C. 2 and 3

D. 1, 2 and 3

**Answer: A**

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7. Which of the following process is/are associated with no change of hybridisation of the underlined compound?

A. B<sub>2</sub>H<sub>6</sub> is dissolved in THF

B. Al(OH)<sub>3</sub> precipitate dissolved in NaOH

C. SiF<sub>4</sub> vapour is passed through liquid HF

D. Hydrolysis of SiCl<sub>4</sub>

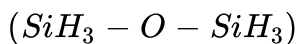
**Answer: A**

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8. Which of the following statements is true ?

A. Dimethyl ether is a better Lewis base than disilyl ether



B.  $(\text{CH}_3)_3\text{C} - \text{O} - \text{H}$  is less acidic than  $(\text{CH}_3)_3\text{Si} - \text{O} - \text{H}$

C. Both the statement (A) and (B) are true

D. Both the statements (A) and (B) are false

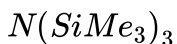
Answer: C



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9. Correct statement among the following is

A. CNC bond angle in  $\text{Nme}_3$  is greater than  $\text{SiNSi}$  bond angle in



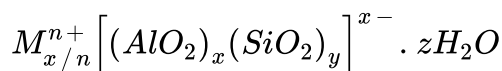
- B. Methyl isocyanate ( $CH_3 - N = C = O$ ) is bent with respect to nitrogen but silyl isocyanate ( $SiH_3 - N = C = O$ ) is linear with respect to the same
- C. In trisilyl amine  $[(SiH_3)_3N]$  all  $N - Si$  bond lengths are longer than the expected  $N - Si$  bond length
- D. All the above statements are correct

**Answer: B**

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10. Which of the following statements is not correct ?

- A. Zeolite contains alumino silicate frame work
- B. The general formula of zeolite is



C. Zeolites are characterised by their open structures that permit the exchange of anions and water molecules

D. Sodalite cage is formed by linking  $24SiO_4$  in the form of tetrahedron

**Answer: C**

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11. Which of the following statements regarding graphite is not correct ?

A. It is a good conductor of electricity

B. It is denser than diamond

C. It is oxidised to  $C_6(COOH)_6$  with alkaline  $KMnO_4$

D. It is thermodynamically more stable than diamond

**Answer: B**

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12. The following are some statements about graphite:

I.  $C - C$  bond lengths is  $1.42\text{\AA}$

II. Distance between two successive layers is  $3.35\text{\AA}$

III. Bond angle is  $60^\circ$

The correct statements is/are

A. all are correct

B. only I and II

C. only II

D. only III

**Answer: B**



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13. Incorrect statement about graphite is

A. used as electrodes

B. used as lubricant

C. it has two allotropic forms  $\alpha$  and  $\beta$

D. paramagnetic

**Answer: D**



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14. Graphite  $\xrightarrow[\text{vapours of potassium}]{\text{heated with}}$   $C_8K$ . Then  $C_8K$  is

I Paramagnetic

II a better conductor than graphite

III highly reactive than graphite

Then correct statement are

A. II and III only

B. I and II only

C. only III

D. All are correct

**Answer: D**



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15. When some of  $Si^{4+}$  in framework silicates are replaced by  $Al^{3+}$  and an additional metal ion, it results in the formation of

- A. Zeolite
- B. Silicones
- C. Disilicates
- D. Glass

**Answer: A**



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16. Thermodynamically the most stable form of carbon is

A. Diamond

B. Graphite

C. Fullerenes

D. Coal

**Answer: B**



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17. Catenation i.e., linking of similar atom depends on size and electronic configuration of atoms. The tendency of catenation in group 14 elements follow the order

A.  $C > Si > Ge > Sn$

B.  $C > Si > Ge \approx Sn$

C.  $Si > C > Sn > Ge$

D.  $Ge > Sn > Si > C$

**Answer: B**

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**18.** Cement, the important building material is a mixture of oxides of several elements. Besides calcium, iron and sulphur, oxides of elements of which of the group (s) are present in the mixture ?

- A. group 2
- B. group 2, 13 and 14
- C. group 2 and 13
- D.

**Answer: B**

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19. Assertion (A) : Silicons are water repelling in nature.

Reason (R ) : Silicons are organosilicon polymers, which have  $( - R_2SiO - )$  as repeating unit.

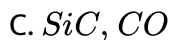
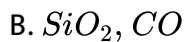
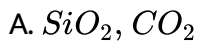
- A. A and B both are correct but R is the correct explanation of A
- B. Both A and R are correct but R is not the correct explanation of A
- C. A and R are both are not true
- D. A is not true but R is true

**Answer: B**



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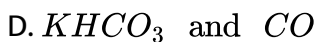
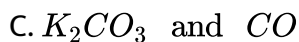
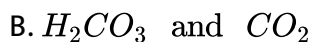
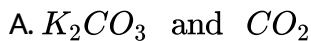
20. An inorganic compound (A) made of two most occurring elements into the earth crust, having a polymeric tetra-hedral network structure. With carbon, compound (A) produces a poisonous gas (B) which is the most stable diatomic molecule. Compounds (A) and (B) will be



**Answer: B**

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21. When oxalic acid is heated cone.  $H_2SO_4$ , two gases produced are neutral and acidic in nature respectively. Potassium hydroxide absorbs on the two gases. The product formed during this absorption and the gas which absorbed are respectively

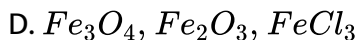
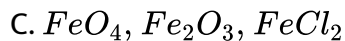
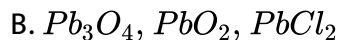
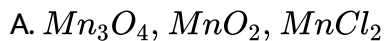


**Answer: A**



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22. A scarlet red compound (X) on treatment with conc.  $HNO_3$  gives compounds (Y) and (Z). (Z) with HCL produces a chloride compound (A) which can also be produced by treating (X) with conc HCL. Compounds (X), (Z) and (A) will be



**Answer: B**



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23. In which of the following silicates, only two corners per tetrahedron are shared ?

I. Pyrosilicate

II. Cyclic silicate

III Double chain silicate

IV Single chain silicate

V 3D Silicate

A. I, II, III

B. IV and VI only

C. I and VI only

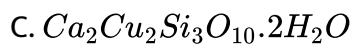
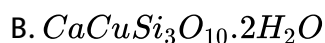
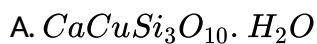
D. II and VI only

**Answer: D**



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24. The silicate ion in the mineral kinoite is a chain of three  $SiO_4^{4-}$  tetrahedral that share corners with adjacent tetrahedral. The mineral also contains  $Ca^{2+}$  ions,  $Cu^{2+}$  ions and water molecules in 1 : 1 : 1 ratio. The mineral is represented as



D. none of these

**Answer: C**

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25. The length of the  $N - Si$  bond in  $(SiH_3)_3N$  is shorter than what is normally expected for an  $N - Si$  single bond. This is due to

A.  $Sp^2 - Sp^2\sigma$  overlap between N and Si atoms

B. Localized  $p\pi - d\pi$  bonding between the N atom and one of the three Si atoms

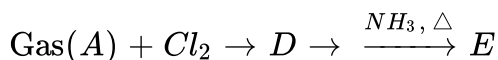
C. Delocalized four-centred two -electron  $p\pi - d\pi$  bonding spread over the N-atom and all the three Si atoms

D. Localized  $p\pi - d\pi$  bonding between the N atom and one of the one Si atoms

**Answer: C**

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26.  $H_2C_2O_4 \xrightarrow{\Delta} \text{gas}(A) + \text{gas}(B) + \text{liquid}(C)$ . Gas(A) burns with a blue flame and is oxidised to gas(B).



A,B,C and E are

A.  $CO_2, CO, H_2O, HCONH_2$

B.  $CO, CO_2, COCl_2, HCONH_2$

C.  $CO$ ,  $CO_2$ ,  $H_2O$ ,  $NH_2CONH_2$

D.  $CO$ ,  $CO_2$ ,  $H_2O$ ,  $COCl_2$

**Answer: C**

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27. A student prepared a sample of silicon chloride by passing chlorine over heated silicon and collecting the condensed silicon chloride in a small specimen tube. He analysed the chloride by dissolving a known mass of it in water and titrating the solution with standard silver nitrates solution. The formula of the silicon chloride as obtained by this method was  $SiCl_{2.6}$  as against a true formula  $SiCl_4$ . Which of the following possible errors could have resulted in this wrong formula?

- A. The silicon chloride contained excess dissolved chlorine.
- B. More silicon chloride than the student supposed was actually used owing to inaccurate weighing

C. The small specimen tube was not dry

D. The reaction between the silicon and the chlorine stopped prematurely leaving some unreacted silicon in the reaction tube

**Answer: C**

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28. The dehydration of malonic acid  $CH_2(COOH)_2$  with  $P_4O_{10}$  and heat give

A. Carbon monoxide

B. Carbon sub oxide

C. Carbon dioxide

D. all the above

**Answer: B**

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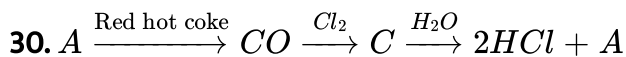
29. Which of the following is correct statement regarding  $N(CH_3)_3$  and  $N(SiH_3)_3$ ?

- A.  $Sp^3$  with pyramidal shape in  $(CH_3)_3N$  and  $Sp^2$  with planar triangular shape in  $(SiH_3)_3N$
- B. In both  $(CH_3)_3N$  and  $(SiH_3)_3N$ , the hybridization of N is  $Sp^3$  are both are pyramidal in shape
- C. In both  $(CH_3)_3N$  and  $(SiH_3)_3N$ , the hybridization of N is  $Sp^2$  are both are planar triangular in shape
- D.  $Sp^2$  with planar triangular shape in  $(CH_3)_3N$  and  $Sp^3$  with tetrahedral shape in  $(SiH_3)_3N$

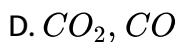
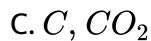
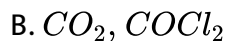
**Answer: A**



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the compounds A and C are

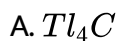


**Answer: A**



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31. An inorganic compound (X) on hydrolysis produces a gas which on treatment with sodium followed by its reaction with ethyl chloride forms another compound (Y). Compound (Y) on heating with Pd catalyst gives (2Z)-pent-2-ene as major product. Hence the inorganic compound (X) is



B.  $BaC_2$

C.  $SiC$

D.  $Mg_2C_3$

**Answer: D**

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32. The b.p of  $CF_4$  is almost half that of  $SiF_4$  while the difference in b.p of  $CCl_4$  and  $SiCl_4$  is little. This is because

A. the negative charge on fluorine cause greater repulsion between

neighbouring molecules in  $CF_4$  where as it is less in  $SiF_4$  due to

back bonding form  $F \rightarrow Si$

B. in  $SiCl_4$  inter-molecular repulsions are more due to the negative

charge chlorine as  $\pi$  back bonding formed  $Cl \rightarrow Si$  is

C.  $CCl$  bonds in  $CCl_4$  are less polar then  $Si - Cl$  bond in  $SiCl_4$

D. All are correct

Answer: D

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## Multiple Answer Type Questions

1. Which of the following is/are correct statement?

A. Zeolites are often used as ion exchange material

B.  $SiO_2$  is a linear molecule

C.  $SiCl_6^{2-}$  is known but  $SiF_6^{2-}$  is not

D. producer gas is less efficient fuel in terms of calorific value than water gas

Answer: A::D

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2.  $Mg_2C_3$  has the following characteristics:

- A. On hydrolysis it gives propyne
- B. it contains  $Mg^{+2}$  and  $C_2^{-2}$  ion
- C. it contains  $Mg^{+2}$  and  $C_3^{-4}$  ion
- D. on hydrolysis it gives propane

Answer: A::C



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3. Which of the following statements is/are correct?

- A. There are  $\pi - d\pi$  bonding in  $(SiH_3)_3N$
- B. lone pair of  $e^-$  of each ends are perpendicular to each other in  $CO_2$
- C. The order of stability is  $CX_2 < SiX_2 < GeX_2 < SnX_2 < PbX_2$

D. Carbogen is a mixture of carbon and  $O_2$

Answer: A::B::C

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4. Choose the incorrect statement (s) from the following

A. the anhydride of carbonic acid is  $C_3O_2$

B. there are two sigma and one pi bond in  $CaC_2$  molecule

C.  $SiC$  is called carborundum

D. Tri silylamine is pyramidal

Answer: A::B::D

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5.  $CO$  can be prepared by

A. heating  $\text{HCOOH}$  with conc.  $\text{H}_2\text{SO}_4$

B. heating  $\text{K}_4[\text{Fe}(\text{CN})_6]$  with conc.  $\text{H}_2\text{SO}_4$

C. heating malonic acid with  $\text{P}_2\text{O}_5$

D. hydrolysis of  $\text{Mn}_5\text{C}_2$

**Answer: A:B**

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6.  $\text{SiO}_2$  reacts with

A.  $\text{Na}_2\text{CO}_3$

B.  $\text{CO}_2$

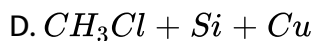
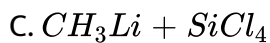
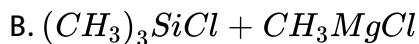
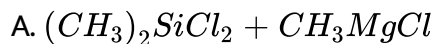
C.  $\text{HF}$

D.  $\text{HCl}$

**Answer: A:C**

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7. Which of the following reactions can be used to form  $Si - C$  bond?

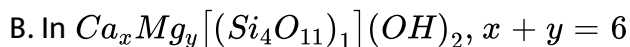
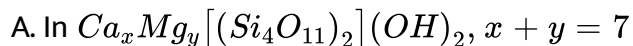


Answer: A::B::C::D

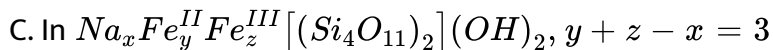


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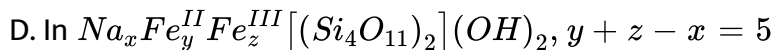
8. Which of the following is/are true for Amphibole ?





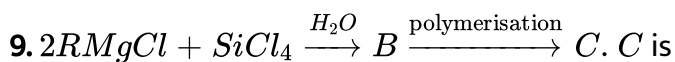


(The two iron in +2 and +3 oxidation state)



Answer: A:C

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A. cyclic silicone

B. linear silicone

C. cross linked silicone

D.  $SiO_2$

Answer: A:C

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## 10. Elements of group 14

- A. Exhibit oxidation state of +4 only
- B. Exhibit oxidation state of +2 and +4
- C. From  $M^{2-}$  and  $M^{4+}$  ions
- D. From  $M^{2+}$  and  $M^{4+}$  ions

**Answer: B::D**



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## 11. $MeSiCl$ is used during polymerisation of organo silicones because

- A. The chain length of organo silicone polymers can be controlled by adding  $Me_3SiCl$
- B.  $Me_3SiCl$  blocks the end terminal of silicone polymers
- C.  $Me_3SiCl$  improves the quality and yield of the polymer

D.  $Me_3SiCl$  acts as a catalyst during polymerisation

**Answer: A::B**

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12. Which of the following statements are correct ?

A. Fullerenes have dangling bonds

B. Fullerenes are cage-like molecules

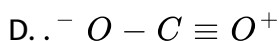
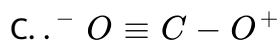
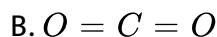
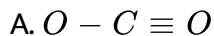
C. Graphite is thermodynamically most stable allotrope of carbon

D. Graphit is slippery and hard and therefore used as a dry ludricant in machines

**Answer: B::C**

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13. Identify the correct resonance structures of carbon dioxide from the one given below:

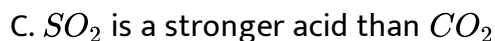
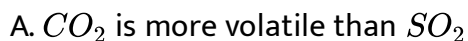


Answer: B::D



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14. When  $SO_2$  is passed through sodium carbonate solution, then  $CO_2$  gas is liberated. This is because

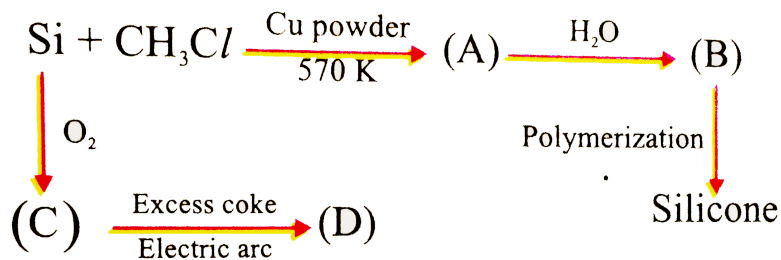


D.  $CO_2$  is a stronger acid than  $SO_2$

Answer: A::B

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15. Identify A, B, C and D in the following reaction sequence



A. The compound A is  $(\text{CH}_3)_2\text{SiCl}_2$

B. The compound C and D are  $\text{SiO}_2$  and  $\text{SiC}$  respectively

C. The compound B is  $(\text{CH}_3)_2\text{Si}(\text{OH})_2$

D. The compound B is  $(\text{CH}_3)_2\text{Si} = \text{O}$

Answer: A::B::C





16. Which of the following statement (s) is/are correct ?

- A. A aqueous solution of sodium carbonate is alkaline because carbonate ion takes up proton and release  $OH^-$  ion from water.
- B. when sodium carbonate is added to the aqueous solutions of  $Al^{3+}$  and  $Fe^{3+}$  they are precipated as their carbonates
- C. if  $Na_2CO_3$  solution is added to the aqueous solutions of  $Ca^{2+}$ ,  $Sr^{2+}$ , and  $Ba^{2+}$  they are precipated as their carbonates.
- D. Addition of  $Na_2CO_3$  solution to the aqueous solution of  $Mg^{2+}$ ,  $Cu^{2+}$ , and  $Zn^{2+}$  precipitates them has their basic carbonates

Answer: A::C::D



17. Choose correct statements:

A. Heat resistance capacity in an organosilicone polymer decrease in the order



B. Ultramarines contain sulphur, phosphorus and halogens

C. Silicon carbide is made by Acheson's method

D. Silicon carbide is a three-dimensional gaint covalent molecule with hardness comparable to that of diamond

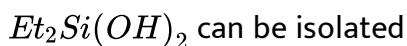
Answer: A::B::C::D



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18. Identify the correct statements

A.  $R_2C(OH)_2$  cannot generally be isolated, but compounds like



- B. In liquid ammonia magnesium silicide and ammonium bromide react to form silane
- C.  $PbSO_4$  is more soluble in aqueous sodium acetate than in aqueous sodium nitrate though  $Pb(NO_3)_2$  is more soluble in water than lead acetate.
- D. Boiling point of  $SiHCl_3$  is less than that of  $CHCl_3$

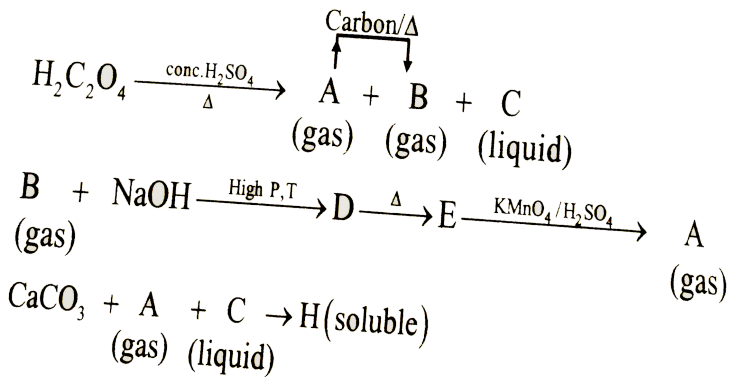
**Answer: A::B::C::D**



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**Comprehension Type Questions**





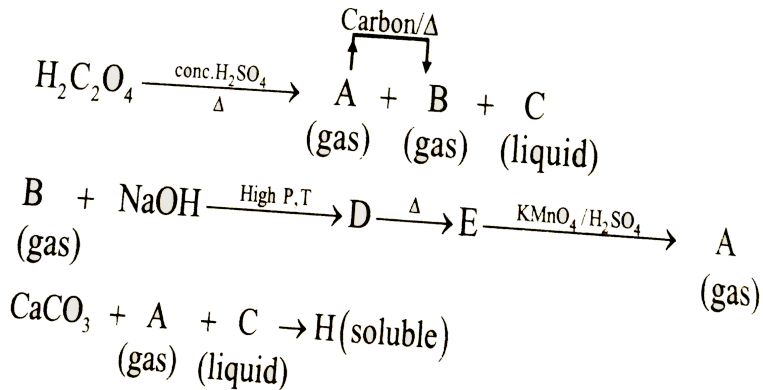
1.

The compound B is

- A.  $\text{CO}_2$
- B.  $\text{CO}$
- C.  $\text{H}_2\text{O}$
- D.  $\text{C}_3\text{O}_2$

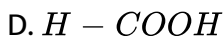
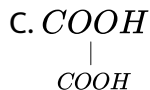
**Answer: B**

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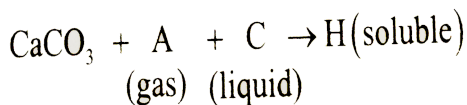
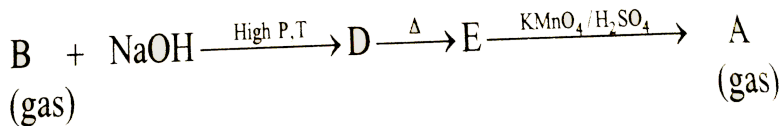
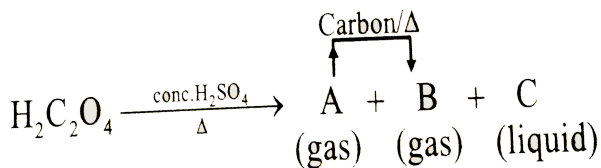
2.

The compound E is



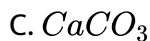
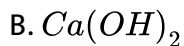
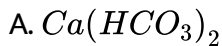
Answer: B

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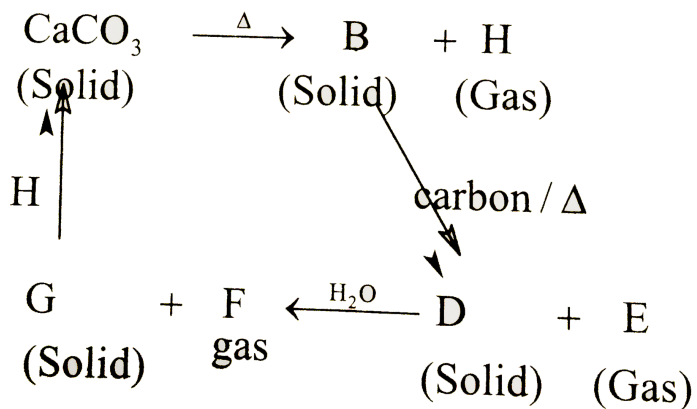
3.

The compound H is



**Answer: A**

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4. \

The compound E is

A. CO

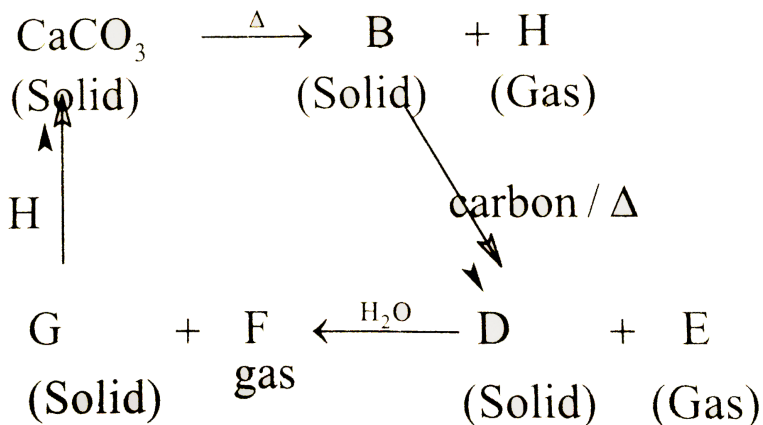
B.  $\text{CO}_2$

C.  $\text{C}_3\text{O}_2$

D. oxide of metal

**Answer: A**

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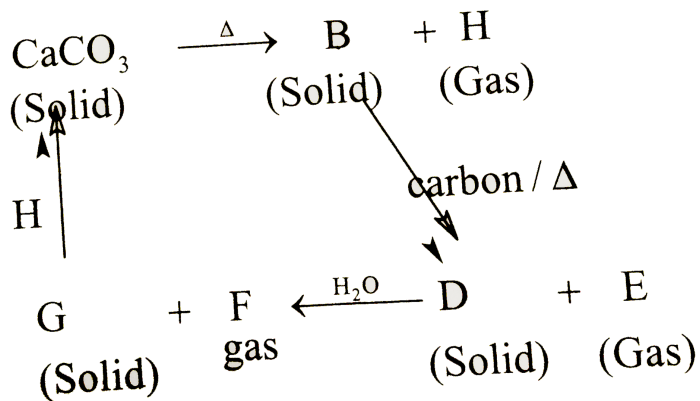
5.

The correct statement about F is

- A. it has  $3\sigma$  and  $2\pi$  bond
- B. it has  $3\sigma$  bond and one  $\pi$  bond
- C. it has angular shape
- D. it is CO gas

Answer: A

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6.

The compound H is

A.  $\text{CO}_2$

B.  $\text{CO}$

C.  $\text{CaO}$

D.  $\text{Ca}(\text{OH})_2$

**Answer: A**



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7. About 95 % of the earth's crust is composed of silicated minerals, aluminosilicate clays, or silica. The majority of silicate minerals are very insoluble, because they have an infinite ionic structure and because of the great strength of the  $Si - O$  bond. The basic structural units of silicate is  $(SiO_4)^{4-}$  tetrahedra. The  $(SiO_4)^{4-}$  tetrahedral may polymerize in to large units by sharing atoms

Pylo-silicates are formed by the sharing of the O atoms on..... corners of each tetrahedron with other tetrahedral

- A. one
- B. two
- C. three
- D. four

**Answer: C**



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8. About 95 % of the earth's crust is composed of silicated minerals, aluminosilicate clays, or silica. The majority of silicate minerals are very insoluble, because they have an infinite ionic structure and because of the great strength of the  $Si - O$  bond. The basic structural units of silicate is  $(SiO_4)^{4-}$  tetrahedra. The  $(SiO_4)^{4-}$  tetrahedral may polymerize in to large units by sharing atoms

Which of the following statement is incorrect ?

- A. Silicates are wide spread in the earth crust because they are very insoluble in water
- B. The  $Si - O$ , bonds are weaker than  $C - O$  bonds because of bigger size of silicon atom
- C. Zeolites are used as ion exchange materials, and as molecular sieve
- D. Sharing of all four corners of a  $SiO_4$  tetrahedron results in a three dimensional lattice of formula  $SiO_2$

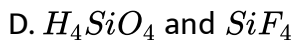
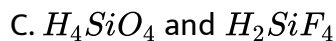
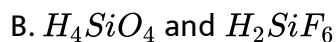
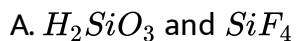
**Answer: B**





9. On hydrolysis, compound (A) gives 'B' and 'C'. On heating, 'B' gives 'D' which dissolves in excess HF acid to give 'E'. When exposed to ammonia drop, 'C' gives dense white fumes of 'F'. When reduced with aluminum powder, compound (A) gives G which produces 'H' when heated with methyl chloride in presence of copper catalyst at 370 K. On hydrolysis, 'H' gives a linear condensation polymer, 'T'. Compounds like 'I' Find a variety of applications.

The formulae of the compounds B and E are respectively.

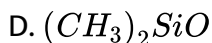
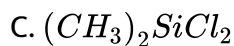
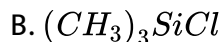
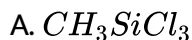


**Answer: B**



10. On hydrolysis, compound ('A') gives 'B' and 'C' On heating , 'B' gives 'D' which dissolves in excess HF acid to give 'E'. When exposed to ammonia drop, 'C' gives dense white fumes of 'F'. When reduced with aluminum powder, compound (A) gives G which produces 'H' when heated with methyl chloride in presence of copper catalyst at 370 K. On hydrolysis, 'H' gives a linear condensation polymer, 'T'. Compounds like 'I' Find a variety of applications.

The compound, H is



**Answer: C**



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11. On hydrolysis, compound ('A') gives 'B' and 'C' On heating , 'B' gives 'D' which dissolves in excess HF acid to give 'E'. When exposed to ammonia drop, 'C' gives dense white fumes of 'F'. When reduced with aluminum powder, compound (A) gives G which produces 'H' when heated with methyl chloride in presence of copper catalyst at 370 K. On hydrolysis, 'H' gives a linear condensation polymer, 'T'. Compounds like 'I' Find a variety of applications.

The compounds like, 'I' may be used as

- (i) insulators (ii) water repellents
- (iii) solvents (iv) lubricants

A. I, ii, and iii only

B. I, iii and iv only

C. ii, iii and iv only

D. I, ii and iv only

**Answer: D**



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## Matrix Matching Type Questions

1. Match the following:

Column I

Column II

- |                     |     |   |
|---------------------|-----|---|
| A Quartz            | (P) | Three corners of $SiO_4^{4-}$ tetrahedron are shared      |
| B Amorphous $SiO_2$ | (q) | Two corners of $SiO_4^{4-}$ are shared                    |
| C Sheet Silicates   | (r) | All four corners of $SiO_4^{4-}$ are symmetrically shared |
| D Cyclic silicates  | (s) | Corners of $SiO_4^{4-}$ are randomly linked               |

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2. Match the following :

Column I

Column II

- |                   |     |                        |
|-------------------|-----|------------------------|
| A Ortho silicate  | (P) | $(SiO_3)_n^{2n-}$      |
| B Chain silicate  | (q) | $(Si_2O_5)_5^{10-}$    |
| C Pyro silicate   | (r) | $SiO_4^{4-}$           |
| D Cyclic silicate | (s) | $(Si_4O_{11})_n^{6n-}$ |
|                   | (t) | $Si_2O_7^{6-}$         |

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### 3. Match the following

Column I	Column II
<i>A</i> Orthosilicate	<i>P</i> Spodumen
<i>B</i> Pyrosilicate	<i>Q</i> Hemimorphite
<i>C</i> single chain silicate	<i>R</i> Beryl
<i>D</i> Ring silicate	<i>S</i> Quartz
	<i>T</i> Zircon

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### 4. Match the following

#### Column I

- A) Ortho-silicate      B) Pyro-silicate  
C) Chain Silicate    D) Two dimensional sheet silicate

#### Column II

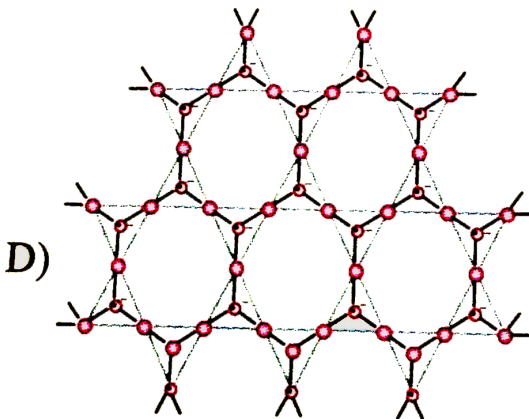
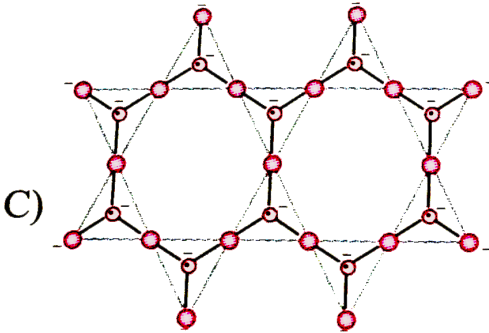
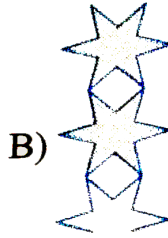
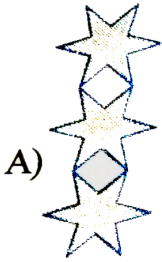
- p) Formed by sharing two oxygen atoms by each tetrahedral
- q) Three oxygen atoms of each tetrahedra are shared with adjacent  $\text{SiO}_4^{-4}$  tetrahedra
- r) Contain single discrete unit of  $\text{SiO}_4^{-4}$  tetrahedra
- s) Contain two units of  $\text{SiO}_4^{-4}$  joined along a corner.

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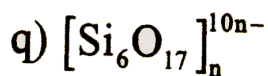


5. Match the following

**Column I**



**Column II**



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6. Match the oxides with solution in which they are absorbed.

**Column I**

A) CO      B)  $CO_2$       C) NO

**Column II**

- p) Absorbed by ethanol amine
- q) Absorbed by  $FeSO_4$  solution
- r) Absorbed by aqueous suspension of  $Cu_2Cl_2$
- s) Absorbed by KOH solution

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7. Match the following :

**Column I**

- A) Inorganic graphite
- B) SiC
- C) Diamond
  
- D)  $SiO_4^{4-}$

**Column II**

- p)  $SP^3$
- q) tetrahedron
- r) weak Vander waals interactions
  
- s) Carborundum



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## Integer Type Questions

1.  $SiF_4$  on hydrolysis gives X and Y.  $SiCl_4$  on hydrolysis gives X and Z.

Covalency of central atom in Y is  $C_1$  and that of halogen in Z is  $C_2$ . Then

$C_1 + C_2$  is:

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2. The mineral lapis Lazuli is a splendid blue colour and was highly prized as a pigment for oil paintings. It contains ultramarine  $Na_x [(AlSiO_4)_y] S_z$ .

Then  $x - y$  is:

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3. In linear chain silicones one Si atom is attached to 'n' number of oxygen atoms. Here 'n' is:

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4. The total number of protons donated by one molecule of ( $H_3BO_3$ ) boric acid is

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5. The convalency of silicon in hydrofluoro silicic acid is.

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6. In the formation of cyclic silicones number of oxygen atoms belong to each silicon atom forming the ring is

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7. In cyclic silicate ion  $Si_6O_{18}^{12-}$  the number of oxygen atoms shared.

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8. What is the coordinates no. of Sn in crystalline layer structure of solid  $SnF_4$ ?

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9. Diamond is formed by the fusion of several carbon tetrahedrons in which carbon atoms in each ring is

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10. How many of the following substances/molecules/ion have bond order 1.33 ?

$BF_3$ , Boron nitride, graphite,

$NO_3^-$ ,  $SO_3^{2-}$ ,  $SO_4^{2-}$ ,  $PO_4^{3-}$

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11. The number of tetrahedral silicate units present in one molecule of the mineral beryl.

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12. The following compound  $(CH_3)_nSi(Cl)_{4n}$  on hydrolysis and on subsequent polymerisation gives a branched chain silicone. What is the value of n?

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13. How many units of  $SiO_4^{4-}$  will be required for the formation of pyrosilicates ?

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14. Silica reacts with magnesium to form a magnesium compound (X). X reacts with dil HCL and forms (Y) and (Z). If two moles of HCL react with one mole of X how many moles of Y will be formed?

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15. When silica reacts with HF, it forms fluorosilicic acid. What is the number of fluorine atoms present in one mole of fluorosilicic acid.

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16. Calculate the minimum number of moles of  $R - Mg - X$  (Grignard reagent) required in the formation of a mole of cyclic silicone.

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17. A compound (X) when heated with conc.  $H_2SO_4$  gives one gaseous product, which under pressure forms sodium methanoate with  $NaOH$ . How many of the list-  $HCOOH$ ,  $K_4Fe(CN)_6$ ,  $H_2C_2O_4$ ,  $CH_2(COOH)_2$  can be (X) ?

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18. How many oxygen atoms of  $[SiI_4]^{4+}$  are shared in three-dimensional sheet silicate ?

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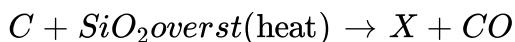
19. A double chain silicone containing 6 Si atoms is prepared from  $(CH_3)_2SiCl_2$  and  $(CH_3)_2SiCl$ . Then the number of  $(CH_3)_2SiCl_2$  units required to prepare that chain silicone is

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20. The oxidation state of C in CO is  $x$ . The oxidation state of C in  $COCl_2$  is  $y$ . then  $y - x$  is = \_\_\_\_\_

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21. The sum of the co-ordination numbers of different elements present in a compound 'X' formed in the given reaction is \_\_\_\_\_.



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22. A piece of graphite has 10 layers, each layer consisting of 40 carbons. It is a good conductor of electricity. Then, the number of unpaired electrons present in that piece is \_\_\_\_\_

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23. Number of methyl group present in tris cyclodimethyl siloxane is \_\_\_\_\_

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24. When two silicon atoms are isomorphously substituted by two  $Al^{3+}$  in a  $(SiO_2)_4$  network, the number of charges on the aluminosilicate anion is

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25. Total number of covalent bonds in  $C_3O_2$  is \_\_\_\_\_

The total number of  $\sigma$  and  $\pi$  bonds present in the compounds are \_\_\_\_\_

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26. The number of corner of O atom shared per tetrahedron in 2D silicate is \_\_\_\_\_

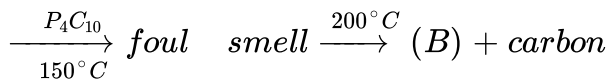




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## 27. Malonic acid

(A)



$\downarrow H_2O$

(X)



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## Previous lit Question

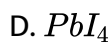
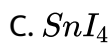
1. Moderate electrical conductivity is shown by

- A. Silicates are wide spread in the earth crust because they are very insoluble in water
- B. Graphite
- C. diamond
- D. none of these

**Answer:**

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2. Which of the following halides is least stable and has a doubtful existence ?



**Answer:**

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3. which one of the following oxides is neutral?

A. CO

B.  $SnO_2$

C. ZnO

D.  $SiO_2$

**Answer:**



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4. The name of the structure of silicates in which three oxygen atoms of

$[SiO_4]^{4-}$  are shared is

A. pyrosilicate

B. sheet silicate

C. linear chain silicate

D. three dimensional silicate

**Answer:**

## Multiple Answer Questions

1. With respect to graphite and diamond, which of the statements given below are correct?

- (1) Graphite is harder than diamond.
- (2) Graphite has higher electrical conductivity than diamond.
- (3) Graphite has higher thermal conductivity than diamond.
- (4) Graphite has higher  $C - C$  bond order than diamond.

- A. Graphite is harder than diamond
- B. Graphite has higher electrical conductivity than diamond
- C. Graphite has higher thermal conductivity than diamond
- D. Graphite has higher  $C - C$  bond order than diamond.

**Answer:**

## Assertion And Reason Type

1. (a) Statement I is true, Statement II is true, Statement II is the correct explanation of Statement I.

(b) Statement I is true, Statement II is true, Statement II is not the correct explanation of Statement I.

(c) Statement I is true, Statement II is false

(d) Statement I is false : Statement II is true

1. Statement I : Between  $SiCl_4$  and  $Cl_4$  only  $SiCl_4$  reacts with water.

Statement II :  $SiCl_4$  is ionic and  $Cl_4$  is covalent



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2. (a) Statement I is true, Statement II is true, Statement II is the correct explanation of Statement I.

(b) Statement I is true, Statement II is true, Statement II is not the correct explanation of Statement I.

(c) Statement I is true, Statement II is false

(d) Statement I is false : Statement II is true

2. Statement I :  $Pb^{4+}$  compounds are stronger oxidising agents than  $Sn^{2+}$  compounds .

Statement II : The lower oxidation states for the group 14 elements are more stable for the heavier members of the group due to 'inert pair effect'



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## Subjective Questions

1. Carbon acts as an abrasive and also as a lubricant, explain.



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2. Give reason for the following in one or two sentences : "Solid carbon dioxide is known as dry ice."

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3. Give reasons for the following in one or two sentences : "Graphite is used as a solid lubricant."

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4. Write the balanced equation for the preparation of crystalline silicon from  $SiCl_4$ .

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5. Draw the structure of a cyclic silicate,  $(Si_3O_9)^{6-}$  with proper labelling.

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6. Starting from  $SiCl_4$  prepare the following in steps not exceeding the number give in parantheses ( give reaction only )

a. Silicon (1)

b. Linear silicon containing methyl groups only (4)

c.  $Na_2SiO_3$  (3).

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## Others

1. Silicones are

A. Synthetic polymers containing repeated  $R_2SiO$  units

B. Silicates with common  $SiO_4$  unit

C. Ketones with silyl group ( $SiH_3$ ) similar to alkyl,  $(SiH_3)_3CO$

D. Zircon (meso Silicates )

**Answer: A**

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2. The minerals having silicate chains are collectively called

- A. Olivine
- B. Zircon
- C. Pyroxene
- D. Natrolite

**Answer: C**



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3.  $[SiO_4]^{4-}$  has tetrahedral structure, the silicate formed by using the three oxygen has

- A. two dimensional sheet structure
- B. pyrosilicate structure
- C. linear polymeric structure
- D. three dimensional structure.

**Answer: A**



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